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CARCINOMA AND ULCER OF THE STOMACH*

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BELIEVING this Association to be the proper channel through which to appeal to the profession of Canada, I have had the temerity to ask for a place on the program, in order to urge again the necessity for the earlier recognition of organic lesions of the stomach, especially carcinoma, and to plead for an intensive renewal of our efforts in this direction.

I am aware that this is a well-worn subject, by many it will be thought to be a threadbare subject, but the fact remains that cancer of the stomach is seldom recognized soon enough to render radical operation permanently effective. While it is true that in the early stages cancer of the stomach is often a silent affection, there are undoubtedly many cases in which a comparatively early diagnosis could be made, were it customary to submit every case of gastric disorder to a searching investigation upon the first appeal for treatment. It is the duty of the practitioner to exclude cancer as a cause of the symptoms before prescribing a course of medicinal or dietetic treatment of any duration; yet, in the history of cancer cases it is rarely recorded that, as soon as the complaints were laid before the physician, a test meal was administered and the stomach tube employed, the stools examined for occult blood, or an x-ray examination made. And, in the majority of cases, surgical opinion is sought only after the symptoms are no longer relieved by regulation of the diet and the administration of alkalies or other drugs. In a series of 48 cases of carcinoma of the stomach operated upon by me at the Montreal General Hospital, gastric symptoms had been present in 30 for a period of more than six months before the true nature of the affection was recognized. Within the past six months there have come under my notice three cases of cancer of the stomach in which the subjective symptoms had for some months been relieved by rest, Sippy diet, and Sippy powders, cases in which a definite diagnosis between cancer and ulcer could not be made upon x-ray examination. These months of palliative treatment represent a loss of very valuable time, time which perhaps ultimately determines whether such patients after operation do or do not make permanent recoveries.

Having in mind the possibility of cancer, one should, in the clinical investigation of gastric cases, inquire especially into:

(a) The *duration* of the symptoms complained of and the type of symptoms assembled under the term "indigestion." Pain, it should be noted, is exceptional, the complaint being rather of discomfort after food.

(b) The *appetite*. Anorexia, or at all events a variable or diminished appetite, is suggestive of cancer. In confirmation of what all have from time time observed, however, Lenoir and Liege[1] have reported an interesting series of cancer cases in which the appetite was not only maintained, but increased.

(c) The *nutrition*. As time passes, cancer patients become aware of loss of strength and loss of weight, signs of failing nutrition.

(d) *Gastric analysis*. In 1879, Van der Velden first taught that the absence of free hydrochloric acid was a diagnostic sign of cancer, and many clinicians still believe that if free hydro-

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chloric acid is detectable in the stomach contents cancer cannot be present. A résumé of recent publications, however, indicates that free hydrochloric acid is present in about half of the cases of gastric cancer. In my series the percentage was 25. While, therefore, the absence of free hydrochloric acid, in combination with other signs and symptoms, is strongly suggestive of a malignant growth, the presence of free hydrochloric acid by no means precludes the possibility of cancer.

It is now known that achlorhydria is the result of three factors:

(1) The destruction of the hormone-bearing mucous membrane of the pyloric canal and pyloric antrum. (In the typical scirrhous carcinoma of the pyloric canal and antrum one would expect the reduction in hydrochloric acid secretion to progress *pari passu* with the destruction of the hormone-bearing mucous membrane. And this is probably what actually occurs.)

(2) The general bodily depression due to cachexia—the toxic factor.

(3) The clogging of the secretory crypts with excessive mucus.

Achylia gastrica is also met with in pernicious anæmia, chronic gastritis, and atrophy of the gastric mucous membrane. Friedenwald and Brown[2] studied 38 cases of cancer in organs other than the stomach (breast, face, tongue, rectum, intestines, pancreas). The free hydrochloric acid content of the stomach was below normal in 55 per cent and absent in 37 per cent. The secretion of free hydrochloric acid was not augmented or re-established after surgical removal of cancer in a distant organ. Pauchet[3] reported 21 cases of cancer of the stomach in which free hydrochloric acid was present. He concluded that the prognosis was much better in these cases than in those with achlorhydria. And this conclusion would accord with the fact that in early lesions free hydrochloric acid is present and that achlorhydria is evidence of extensive pyloric infiltration. On the other hand, Hartman's[4] studies over a period of five years, on 80 resected cases of carcinoma, led him to believe that those with anacidity showed twice as satisfactory results as those in which free hydrochloric acid was present in the gastric secretion.

Mendel and Engel[5] have presented evidence to show that the lactic acid in the gastric contents in cancer cases is due to the action of a substance produced by the cancer itself on the glucose of the food.

(e) *X-ray examination.* This is in many cases of inestimable value, but, as we know from experience, the differentiation between early cancer and peptic ulcer by means of x-ray is not always possible. It is a very human tendency to assume that the lesser evil is the cause of the disorder and to settle comfortably into the conviction that the diagnosis of ulcer has been confirmed when, upon Sippy diet and alkali powders, the patient is relieved of all subjective symptoms.

(f) *Bleeding time.* According to Wiel,[6] the bleeding time is normal in gastric cancer, but prolonged to seven or eight minutes in ulcer.

(g) *Bacteriology.* The sarcinæ and Boas-Oppler bacilli which accompany prolonged stagnation are not found in early cancer cases. Meyeringh[7] has studied the bacteriology of the stomach and duodenum in ulcer and cancer, and has come to the conclusion that there is a rich flora in malignant disease, but a scanty one in benign ulcer. The bacillus coli is quite frequently absent in ulcer cases.

(h) *Sero-diagnosis of cancer.* Botelho, Roffo, and Kahn continue to publish work on the academic aspects of this question, but so far there does not seem to be any reliable test which can be applied clinically.

From the foregoing it is evident that there is as yet no reliable clinical sign or test for early cancer of the stomach. What, then, is the procedure in doubtful cases? I feel very strongly that, in all cases of chronic gastric disorder appearing after the age of forty, irrespective of whether the lesion is thought to be ulcer or cancer, the abdomen should be opened and the stomach directly examined. This can be done with a minimum of hazard, if local anæsthesia is employed for the exploration. Even when the abdomen has been opened and the stomach exposed, there are often occasions when an experienced surgeon is unable to say whether the lesion is benign or malignant. Such an eminent authority as von Haberer[8] admits that in 5 per cent of ulcer cases he could not be sure on exposure that cancer was absent. Finsterer[9] reports that in a series of 145 cases in which resection was performed for supposedly simple ulcer, 21.4 per cent were proved histologically to be cancerous.

It would seem fitting to say something here upon the relation of cancer to chronic peptic ulcer. During the past five years many important papers have been published on this point, but the opinions expressed have been very divergent. There are three main aspects of the subject:

1. Can a gastric cancer be converted into a gastric ulcer? The remarkable case reported by Thalheimer and Wilensky[10] apparently answers this question in the affirmative. They describe a specimen showing a callous ulcer and multiple cancerous metastases, and present very convincing evidence that the ulcer was formerly a cancer and that the malignant tissue had been completely digested away.

2. What percentage of cases of cancer of the stomach originate in peptic ulcer? Those qualified to answer this question do not agree. Estimates vary from zero to 71 per cent. The latter figure is taken from the much discussed contribution of Wilson and McCarthy.[11] Expert statistical study of the available data would probably be needed to give an accurate estimate of the percentage. Certainly it cannot be very high, possibly from 5 to 10 per cent.

3. What percentage of ulcer cases become cancerous? (This question would, upon a superficial view, appear to be the same as No. 2. To illustrate the difference: it might be proved that all carcinomata originated in ulcer, but this would not prove that all ulcers become carcinomatous.) McCarthy[11] affirms that 68 per cent of the gastric ulcers in his series were associated with cancer, while Ewing[12] says that anything above 3 per cent is a high figure. Finsterer's[9] figure is 26.6 per cent, Orator's[13] 10 per cent in 700 cases. Eusterman[14] maintains that every ulcer is potentially a cancer.

Intensive investigations have been carried out along various lines: (1) animal experimentation; (2) comparison with other cancerous and ulcerative lesions in human cases; (3) statistical studies of human cases; (4) gross anatomical and microscopical studies of human cases; and (5) clinical studies.

Animal Experimentation

Hemmeter, Futterer, and Maniscalio[15] have, by irritation of artificially induced ulcers, produced in animals interesting growths described by them as malignant. Ewing,[12] however, points out that these growths have lacked the progressive character of cancer.

Comparison with Lesions in other Organs

Cancer and ulcer may co-exist in the lip, tongue, tonsil, larynx, œsophagus, rectum, or in x-ray dermatitis, but in these lesions the ulceration invariably follows the malignant growth. On the other hand, ulcers may exist for years in the duodenum, where cancer is a curiosity; lupus is complicated by cancer only after an average duration of 30 years; and in varicose ulcers malignant change is met with but rarely, and then as a rule only in the most chronic cases. While this evidence is against the frequent transformation of ulcer into cancer, it must be remembered that the stomach may possibly be an exception.

Statistical Studies

R. Williams[16] has made a statistical investigation of the age incidence and location of gastric ulcer and cancer and the occurrence of cancerous degeneration in ulcers elsewhere in the body. His conclusions are against a great frequency of carcinomatous change in peptic ulcer. Bamberger[17] followed for a considerable period 1,025 cases in which gastro-enterostomy had been performed for gastric ulcer. Cancer developed in 22 cases (2.1 per cent). Von Eiselberg in his own cases observed 5 per cent; Hirschfeld[18] from 5 to 6 per cent. These figures might very well, and undoubtedly do, include cases in which cancer was present at the time of operation, but not recognized. Although it cannot be proved to be true, there would appear to be substantial clinical support for Paterson's contention that, following gastro-enterostomy and the admittance of pancreatic secretion into the stomach, there is conferred upon the stomach the same immunity to cancer as is enjoyed by the small bowel.

Pathology

Hauser's[19] original description of ulcus carcinomatosum has been unsurpassed in modern literature. Of the later descriptions, Ewing's[12] conforms to Hauser's. Cancer is said to begin on the pyloric side of the previously existing ulcer. The base of the ulcer remains unchanged, since it can be involved by cancer only from the peritoneal side. While chronic ulcers produce shortening of the lesser curvature, thickening of

the serosa and approximation of the lymph nodes by cicatricial contraction, these changes are more marked in the presence of secondary cancer. The lymph-nodes become large and hard. Metastases occur, practically always, in the liver, although many cases die from pyloric obstruction while the lesion is still confined to the stomach and proximal glands. Perforation of a cancerous ulcer may terminate the case.

To Hauser[19] again we owe the best description of the histological features of true "ulcerocancer." The process begins in the edge of the ulcer nearest to the pylorus and consists of a downward growth of atypical glands, which soon break up into irregular alveoli lined by atypical cylindrical or cuboidal cells. The muscle tissue layers of the muscularis mucosa and of the true muscle coat show a definite rearrangement, and the callous ulcer base is free from cancer, unless it is invaded from the peritoneal side (Hemmeter[20]).

If all pathologists would adopt these criteria as standards of malignancy occurring in peptic ulcer, there would probably be a closer agreement on the question of the frequency of this lesion.

CLINICAL STUDIES

A résumé of the clinical aspects of a series of gastric cases does little to assist in the perplexing problem of the possible origin of cancer in ulcer. On the contrary, it seems to make the question more difficult, since one is made to realize that a clinical differential diagnosis between an early (*i.e.*, curable) cancer and a chronic peptic ulcer is frequently impossible. We have learned by bitter experience the importance of diagnosis at the earliest possible moment. The realization, too, that in many cases an absolute diagnosis can be arrived at only by histological study, prompts the surgeon to urge early laparotomy in cases of gastric disease. The clinician's duty is not only to name the disease, but also to cure it, and of these two duties the latter is the more important. Perhaps one can illustrate best by analogy the importance of early diagnosis of cancer of the stomach. The efficacy of early operation in cancer of the breast would appear to be beyond question. In this outward and visible form of malignant disease early detection is possible, and, where operation antedates glandular metastasis, the percentage of permanent cures is very high, being at least 75 per cent. On the other hand, in all cases of breast cancer with axillary metastases, from 77 to 80 per cent die of cancer within three years. With the methods at present at our disposal it may be too much to hope that a diagnosis of cancer of the stomach can be frequently made while the disease is in the primary stage, that is while it is still confined to the stomach, but, if a concerted effort on the part of the profession, such as I have suggested at the opening of this paper, should result in the detection of all cancers of the stomach even in the stage of proximal glandular metastasis, radical excision would, I believe, offer as good a prospect of permanent cure as in breast cancer of the same status. This would mean that in from 20 to 23 per cent of cases of carcinoma of the stomach in the early second stage, permanent cures following radical excision might be expected. Even this result, excluding as it does the cases in which lymph-glandular involvement has not yet occurred, would be a tremendous advance upon present results. But is it not possible to eclipse the prognosis which is warranted by the diagnosis of cancer of the stomach in the stage of early glandular involvement? It undoubtedly is, and in time will be realized, but only at such time as the practitioner is prepared to submit promptly to the surgeon for radical treatment all gastric lesions, whether diagnosed as cancer or ulcer. In support of this view one can but refer again to the experience of Finsterer, von Haberer, and others, which proves beyond question that a large percentage of cases can be adjudged cancer or ulcer only by the pathologist. In these cases the cure precedes the diagnosis in fulfilment of the more pressing urgency.

To revert to the present status of diagnosis and the surgical results, I feel very strongly that, in spite of the frequency of recurrence following gastrectomy, all cases of cancer of the stomach, however "inoperable" they may appear to be on physical examination, should be explored, and that, in the absence of infiltration of the pancreas, involvement of the transverse colon, or metastases in the liver, resection should be undertaken. Quite apart from any prospect of permanent cure, radical excision gives to the obstructive case an extension of life prospect of approximately two years, whereas without opera-

tion it would be about six weeks. Furthermore, as is the rare experience in the treatment of advanced cancer of the breast, excision in an apparently hopelessly advanced case may give an even longer respite. In illustration of this occasional brand that is saved from the burning I would cite briefly the following case:

C. L. W., male, aged 49, a resident of Granada, B.W.I., was admitted to the Montreal General Hospital (service of Dr. H. A. Lafleur) on December 11, 1923. The patient presented the usual symptoms of pyloric obstruction, namely, discomfort after food, coffee-ground vomitus, loss of weight, and loss of strength, symptoms which had been present for three months. On examination of the abdomen there could be seen and felt a large tumour in the pyloric region. The x-ray confirmed the diagnosis of extensive pyloric cancer with 48-hour retention. Under ether anæsthesia subtotal gastrectomy, with removal of the sub-pyloric lymph nodes as well as the lymph nodes in the gastro-hepatic omentum (the latter containing metastases), was performed, concluding with a retro-colic anastomosis between the gastric stump and the jejunum (Polya). Recovery was uneventful. After a lapse of four and a half years the patient is in normal health and throughout this period has been able to carry on without interruption his duties as a government official.

Finally, as an additional plea for radical excision even in advanced cases, subject of course to those restrictions already mentioned, one should point out that recurrence is almost invariably in the liver and runs a rapid and usually painless course. Recurrence in the stomach itself is unusual, and the patient is spared the distress of persistent vomiting and a death from starvation.

Time will not permit of a discussion of the technical procedure of gastrectomy. The risks are those of intestinal resection generally and post-operative deaths are due to pneumonia, not to peritonitis. Under local infiltration of the abdominal wall for the incision and of the root of transverse mesocolon and gastro-hepatic omentum along the lesser curvature at the junction of the fundus with the œsophagus, or by the use of splanchnic anæsthesia after the abdomen has been opened, resection can be carried out without discomfort to the patient. This method of anæsthesia permits the inclusion in the operable class of a large number of patients who, because of the cachexia and extreme anæmia, could not be given a general anæsthetic without too great hazard.

Attention was then drawn to an exhibit of a series of casts of stomach lesions, both cancer and ulcer. These beautiful preparations were the work of Miss Hortense Douglas, artist to the Montreal General Hospital. They were prepared with infinite care and fidelity and undoubtedly were a great advance upon the actual specimens fixed and preserved by chemical agents.

Acknowledgement was made to Drs. Bazin, Barlow, and Howard for the loan of specimens from their services.

The specimen of benign and malignant papilloma was rather unique. This was a case where the early symptom (hæmorrhage) was erroneously attributed to high blood pressure. Had the case been investigated radiographically three years ago and operation performed, there was no doubt that the diffuse papillomatosis would have been found to be wholly benign. (X-ray diagnosis of both benign and malignant papillomata was made by Dr. Ritchie, radiologist to the Montreal General Hospital).

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"Whoever is to acquire a competent knowledge of Medicine ought to be possessed of the following advantages: a natural disposition; instruction; a favourable position for the study; early tuition; love of labour; leisure. First of all, a natural talent is required, for when nature opposes everything else is vain; but when nature leads the way to what is most excellent, instruction in the art takes place, which the student must try to appropriate to himself by reflection, becoming an early pupil in a place well-adapted for instruction. He must also bring to the task a love of labour and perseverance, so that the instruction taking root may bring forth proper and abundant fruits."—*Hippocrates.*

XUM

THE TREATMENT OF PERNICIOUS ANÆMIA*

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TWO years ago, on a similar occasion, I had the honour of addressing the members of this Association on the subject of Addison's "pernicious" anæmia.[1] In discussing the treatment of this disease at that time I stated that Minot[2] had recently reported favourable results from the feeding of liver. Since then the results obtained by Minot and Murphy have been fully confirmed by a number of clinicians, both on this continent and abroad.

Successful as the feeding of liver is in the treatment of pernicious anæmia it does not follow that other important features of our former regime of treatment can be disregarded and their value lost sight of. Adequate rest in bed, with controlled rest and exercise to avoid fatigue, attention to possible foci of infection, and the administration of hydrochloric acid are just as important to-day as before the days of liver feeding. Early diagnosis, the removal of foci of infection, and adequate rest in the early stages of treatment of pernicious anæmia are the three principal requirements if the best results are to be obtained from the feeding of liver.

Why are these important? In addition to the signs and symptoms of anæmia present, the result of disease of the hæmatopoietic system, signs and symptoms are found characteristic of disease of other systems of the body, more particularly of the digestive and nervous systems, *e.g.*, periodic sore tongue, and persistent numbness and tingling of the extremities, indicating that the disease is not confined to the blood forming organs. As these latter symptoms often appear before significant signs of anæmia develop, and constitute the chief complaint of some patients, failure to recognize them as possible manifestations of pernicious anæmia leads to a false diagnosis and the treatment of the case for some indefinite condition affecting the digestive or nervous systems. As a result, the associated changes in the nervous system are allowed to advance to a stage where complete recovery of function is impossible, despite the cure of the anæmia; or complete anorexia develops, often associated with other distressing gastrointestinal symptoms, which makes the institution of liver feeding very difficult.

The removal of foci of infection is important for several reasons: (1) Focal infection is known to affect the bone marrow and cause an anæmia of the secondary type. The presence of a focal infection in patients suffering from pernicious anæmia is not only an additional cause for the production of anæmia but, more important, liver therapy is of little value in the treatment of anæmia due to focal infection. The response of pernicious anæmia patients to liver feeding is less satisfactory in the presence of a focal infection; (2) Foci of infection may affect all systems of the body, and structures like the spinal cord, the tongue, and possibly other organs already affected by the existing pernicious anæmia, are more susceptible than healthy tissues to the toxic effects of a focal infection, and the improvement in symptoms caused by these changes following liver treatment is naturally slower and often incomplete. Experience in the treatment of pernicious anæmia cases has shown that symptoms apparently relieved during treatment may reappear with the development of an intercurrent infection. There can be no doubt, therefore, as to the importance of the eradication of all foci of infection at a favourable time during the course of treatment.

Lastly, the importance of rest:—In patients suffering from any form of anæmia, fatigue both mental and physical is often one of the major complaints. Rest is the best form of treatment for fatigue from any cause, and the prevention of fatigue by absolute rest, followed by controlled rest and exercise periods later, is considered essential for the successful treatment of disturbances of function due to lesions of the nervous system, such as are so commonly found in pernicious anæmia. In this disease rest is necessary in treatment; firstly, until the anæmia is improved to a degree where exercise may be taken without fatigue; and secondly, until an adequate time has been given for sufficient im-

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provement to take place in the lesions affecting the nervous system to allow of a moderate degree of activity, both physical and mental, without the development of fatigue.

GENERAL PLAN OF TREATMENT

All patients suffering from pernicious anæmia should have absolute rest in bed and freedom from all responsibilities at the beginning of treatment. If gastrointestinal symptoms are not marked, and the patient is able to eat, he should be given a balanced diet containing milk, green vegetables, fresh fruit, and red meats, including, 150 to 240 grams (5-8 ounces) of liver daily.[3] After a few days the appetite improves and the patient feels better. The slight fever, the sore tongue, and the bilirubinæmia present soon disappear. At the end of two weeks the percentage of hæmoglobin begins to rise, and a corresponding increase in the number of red blood corpuscles occurs. In our series of cases the increase in the hæmoglobin during the first month averaged 27.5 per cent; the highest being 64 and the lowest 10 per cent. In the second month, the increase averaged 20 per cent and at the end of three months of treatment the hæmoglobin was usually above 80 per cent and the red blood corpuscles more than 4,000,000. This improvement has been maintained without remissions for periods up to two years in patients following the treatment prescribed. All these patients received 150 grams of cooked liver daily. In a large series of cases reported by Minot and Murphy[4] the average number of red blood corpuscles at the beginning of treatment was 1,483,000; at the end of two months 4,200,000; and in the cases which had adhered to diet, observed at the end of two years, the red blood corpuscles were more than 4,500,000. This group of patients received approximately 200 grams of liver daily. Although improvement in the anæmia during the first two months in their series of cases was a little more rapid than in ours, given 150 grams of liver daily, the latter quantity in our experience has been found sufficient to maintain the number of red blood corpuscles and the percentage of hæmoglobin at or about a normal level.

Liver may be served raw or cooked. It may be ordered as liver and bacon, or it may be ground to a pulp and the daily quantity given raw in fruit juice, or lightly cooked as liver soup, liver hash, croquettes or patties. If the preparation is varied from day to day little difficulty is experienced in persuading the patient to take the prescribed amount. In patients with severe gastrointestinal symptoms, such as complate anorexia, nausea and vomiting, some difficulty may be found during the first few days of treatment. If one is persistent and succeeds in getting them to take liver in some form for three or four days, the serious gastrointestinal symptoms disappear, the appetite returns and, as Minot and Murphy have reported, they may become ravenously hungry. At the end of a week they are usually able to take a fairly liberal diet. The preparation of a suitable liver extract has greatly simplified the treatment of this type of case, as a dose of the extract, given in some fresh fruit juice, is usually retained. If no liver extract is available, liver soup or liver juice expressed from slightly cooked, ground liver may be given with the juice of an orange or grape fruit. It may be necessary to feed the patient through a duodenal tube for the first couple of days. In the past a few of these patients were tided over by transfusion; many, if not the majority, died.

In most cases at rest in bed distressing symptoms disappear in a week or two, and at the end of a month even peripheral nervous manifestations, such as numbness and tingling, especially if they have been of short duration, have disappeared. The patient feels well and wants to be up and about. In allowing him up, the avoidance of fatigue should be our chief concern in treatment. Patients with no symptoms referable to the nervous system may be allowed up after two weeks if the hæmoglobin is over sixty per cent. The amount of exercise should be increased daily, always within the point of causing fatigue, until the patient is able to resume work. Recovery from nervous manifestations appears to be dependent not only upon their severity but upon their duration, and improvement takes place slowly as compared with other symptoms. With liver treatment the improvement in the general condition of the patient, and the cure of the anæmia, are so rapid, in comparison with the usual results obtained from former methods of treatment, that patients are now allowed to become active, both physically and mentally, too early in treatment. Patients should have absolute rest for one month after the nervous symptoms have been relieved or become stationary; then rest and exercise should be controlled according to the severity and character of the symptoms. Once numbness and tingling have been relieved, fatigue from over-

activity, the development of an infection, or the interruption of liver treatment, have been in our experience the three factors responsible for their recurrence. In patients complaining of difficulty in walking, due to lesions in the posterior and lateral columns of the cord, almost complete recovery may take place, and the patient be able to walk without difficulty if the complaint has been of short duration. In long standing cases marked improvement may occur, but a definite disability remain. Hence the importance of the early recognition of the nervous manifestations of pernicious anæmia. A history of numbness and tingling, or the development of signs suggestive of tabes dorsalis, should be an indication for the most careful examination of the blood, to exclude or prove the presence of pernicious anæmia.

When a patient is taking the required amount of liver daily and not responding to treatment a focus of infection should be suspected. In the presence of an infection the response of the bone marrow to liver feeding is poor, the relief of symptoms is delayed, and in patients relieved of symptoms the development of an intercurrent infection, *e.g.*, tonsillitis, often causes a return of symptoms, such as numbness and tingling. Every case should be carefully investigated for possible foci of infection, particularly in the upper respiratory tract, and in the case of male patients in the prostate. If an acute or subacute infection is present local treatment should be given until the infection subsides and the general condition of the patient has improved, before suggesting removal by operation. If multiple foci of infection are present they should be removed gradually, otherwise severe reactions with exacerbations of symptoms may follow. Too often patients with several infected teeth are advised to have them extracted, and unless the dentist is warned he may remove them all at one sitting. The physician should supervise extractions, advising the removal of one in the beginning, and further extractions according to the reaction that takes place. Possible metastatic foci of infection in the gall bladder, appendix, etc., should not be forgotten. In patients adhering to treatment, but not improving, in whom no foci of infection have been found, continue the search for an infected focus.

In pernicious anæmia achlorhydria (not the result of the disease but probably a factor in its development) is always present. An attempt should be made to compensate for the deficiency of hydrochloric acid in the stomach by the liberal administration of this acid, as recommended by Hurst. Treatment should begin with one drachm of dilute hydrochloric acid in a tumblerful of fruit juice sweetened with sugar, the patient being instructed to take one-third half an hour before each meal, one-third during the meal and one-third one-half hour after each meal. This dose should be increased until he is taking one and one-half to two drachms three times a day. He should be advised to drink the acid fruit juice mixture through a straw or, if taken in the ordinary manner, to wash the mouth with water. While it is true that the anæmia and the associated symptoms will improve without the administration of acid, it seems advisable to compensate for the acid deficiency by prescribing it in the dose recommended. Patients once accustomed to taking acid usually refuse to give it up.

Blood transfusions are seldom indicated. With the number of red blood corpuscles below a million, and nausea and vomiting present, a single transfusion of blood is often followed by an improvement in the general condition of the patient, which may tide him over until he is able to take an adequate quantity of liver.

A liver extract is now available as a substitute for whole liver. The active principle which is effective in the treatment of pernicious anæmia has been found by Cohn,[5] an associate of Minot, to be present in a non-protein fraction of the liver. It is soluble in water, insoluble in ether, precipitated by alcohol, is free from lecithin and ordinary lipoids, and contains 7 per cent of nitrogen and only a trace of iron and sulphur. This extract, when prescribed with the diet recommended above, but without the addition of liver, has the same effect on the blood forming organs in pernicious anæmia as whole liver. In beginning treatment, Minot and his associates[6] recommend a dose of extract equivalent to the amount derived from 500 to 600 grams of liver. Later, this may be decreased to the amount derived from 300 to 400 grams. We have found that this latter dose produces the same rate of improvement in the blood as 150 grams of whole liver. At the present time liver extracts prepared by a number of pharmaceutical firms are on the market. These extracts are not all of equal potency. Unless the physician is able to have the patient's blood examined daily during the first two weeks of treatment, to determine the reticulocyte response, and thereby test the

potency of the extract, he will be well advised to begin treatment with whole liver, or to prescribe only a liver extract from a batch known to be potent. This is particularly important in patients with marked gastrointestinal symptoms and a severe degree of anæmia.

A word with reference to the value of liver in other types of anæmia. The public, generally, know of the striking results obtained in the treatment of pernicious anæmia from the feeding of liver. To-day many people are taking liver because they are pale, and many physicians are prescribing liver in all types of anæmia. The feeding of liver has a specific effect on the bone marrow in pernicious anæmia,[4] producing a temporary but prompt marked increase in the reticulocytes, followed by a rapid rise in the number of red blood corpuscles toward a normal level, which is maintained as long as the patient continues to take an adequate quantity of liver. No such reticulocyte response or rise in the number of red blood corpuscles occurs in the common secondary types of anæmia. No results are obtained in the treatment of secondary types of anæmia which justify the feeding of large quantities of liver.

Patients undergoing treatment for pernicious anæmia should return periodically for an examination of the blood. They should be questioned as to the amount of liver they are taking each day. Careful enquiry should be made as to the return of symptoms previously relieved by treatment, especially with reference to the early digestive and nervous manifestations of the disease. In one of our patients a sore tongue recurred when the red blood corpuscles were about normal in number. It was later found that this patient for economic reasons was taking liver irregularly. Just as periodic sore tongue may occur in the beginning of the disease before a definite anæmia has developed, so it may antedate the development of anæmia in a relapse, and be the first indication that the patient is not receiving an adequate quantity of liver. Three factors appear to be chiefly responsible for the reappearance of anæmia, or the return of symptoms previously relieved by treatment, or the exacerbation of nervous manifestations that had become stationary. They are: (1) an inadequate daily amount of liver; (2) infections; (3) activity beyond the physical or mental reserve of the patient. Hence the importance of periodic examinations to check the development of even mild relapses.

If the plan of treatment just outlined is followed, and the patient co-operates in the treatment, we are justified in concluding that the anæmia present in pernicious anæmia will be cured, that signs and symptoms not the result of structural changes in a stage beyond repair will disappear, and that the disease will remain under control so long as the patient takes the required daily amount of liver or suitable liver extract. The successful treatment of another disease has been accomplished.

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"When we turn to chronic rheumatism the first thing that strikes the eye is the complexity of the picture. In this picture, however, certain features are found which resemble those of acute rheumatism: the disordered skin reaction, the disturbance of endocrine function, and the specific tissue reaction to low-grade streptococci, namely, the nodule. Like acute rheumatism, these conditions—whether infective arthritis, fibrositis, or osteo-arthritis—must be looked upon as biological deviations, as system diseases. The first two have their seeds in early life, while the last may be a part of the general deterioration of advancing years affecting joints which have been weakened by strain, trauma, or infection, acting separately or together. In the investigation of these diseases it is necessary to pay attention to the biochemical constitution of the patient, and deviations from the normal will often, if not always, be met with. The commonest are disturbances in sugar tolerance, alterations in the pH values of the body fluids, and abnormalities in the metabolism of calcium, phosphorus, and sulphur. The endocrine organs, and more particularly the thyroid gland, are as a rule at fault, hypothyroidism being associated particularly with fibrositis and chronic synovitis, and dysthyroidism with infective arthritis. Foci of infection are of great, but not exclusive, importance, and faulty elimination must also be taken into account."—*Brit. M. J.*, 1928, i, 860.

XUM

THE STUDY OF THE EFFECT OF VARIOUS AGENTS, CHIEFLY SUNLIGHT, UPON THE SUSCEPTIBILITY OF RACHITIC RATS TO INFECTION

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THIS communication is a complete summary* of results obtained in a study of the effect of sunshine on rachitic rats, as measured by their susceptibility to infection. As the shorter ultraviolet rays in the sunshine improve the rickets in these animals, a brief comparative study, using the same test of susceptibility, of the effect of other antirachitic agents, *e.g.*, the mercury-vapour lamp (so-called artificial sunlight), cod liver oil, and irradiated ergosterol, was undertaken. Similar experiments were carried out to determine if possible whether exposure to cold air was a factor in raising the resistance of these animals.

The Rats†

Albino rats, twenty-five to twenty-seven days old, were used as the test animals. The diet and environment of the breeding rats were kept constant, in order to reduce to the minimum the variation in the amounts of vitamin D stored up during lactation. All the rats, except a few in the last experiments which were given a normal diet, were put on McCollum's rachitogenic diet 3143, as soon as they were received, and were kept on this diet for four weeks. At the end of this time their resistance to infection was determined.

The Infecting Organism

A strain of *B. coli communis*, which had been obtained in a nasal culture from a normal rat, was used as the infecting organism. Eighteen hours' growths on plain agar slants were washed off with measured amounts of saline, and a small quantity of this suspension was injected into the peritoneal cavity. In the first ten experiments (Table I and about 1/5 of those in Table IIa), all the rats in each experiment received the same amount of suspension. In all the later tests, each animal was given a dose proportional to its weight (0.003 c.c. per grm. body weight). For example, a rat weighing 76 grm. would be given 0.23 c.c. of the suspension.

As the sun-exposed rats frequently weighed on the average a little more than the rats kept inside, they received larger doses, which made the test more severe.

From the results of a number of supplementary experiments, we believe that the rats, following the injection, die from a generalized infection. Post-mortem examinations, including blood cultures, were made on all the dead rats. When a capillary pipette was used to obtain the blood from the heart, practically 100 per cent of the dead rats showed pure cultures of Gram-negative bacilli. The biological and serological reactions of three recovered strains were studied and they were identical with those of the injected organism.

The results of the first 6 experiments,‡ which have previously been described in detail, are summarized in Table I. Twice as many sun-treated as inside rats survived the infection.

Table II (A) is a summary of the results obtained in 18 experiments in which was com-

TABLE I.

Inside Rachitic

Exposed to Sunshine for 4 Weeks	Total Number	Number Dead	Per Cent Alive	Average Weight (Grams)
February to June	36	24	33%	59

Sun-treated Rachitic

Exposed to Sunshine for 4 Weeks.	Total Number	Number Dead	Per Cent Alive	Average Weight (Grams)
February to June	36	11	67%	66

* A preliminary report of the first series of experiments was published in this *Journal*, September, 1927, xvii, 1033. A detailed report including a review of the literature will be published later.

† A number of these rats were from among those provided for studies on the antirachitic effect of sunshine, by the funds of a grant from the Department of Health of the Province of Ontario.

‡ The author is much indebted to Dr. A. Brown and Dr. F. F. Tisdall, who supervised the feeding and irradiation of the animals.

TABLE II (A)

1. Inside Rachitic

Exposed to Sunshine for 4 Weeks	Total Number	Number Dead	Per Cent Alive	Average Weight (Grams)
October to February—May and June	103	77	25%	55

2. Mercury Lamp Rachitic

Exposed to Sunshine for 4 Weeks	Total Number	Number Dead	Per Cent Alive	Average Weight (Grams)
October to February—May and June	101	63	38%	51

3. Sun-treated Rachitic

Exposed to Sunshine for 4 Weeks	Total Number	Number Dead	Per Cent Alive	Average Weight (Grams)
October to February—May and June	105	59	44%	58

TABLE II (B)

Details of Experiment No. 22

Rats injected January 10 (exposed to sun in December and January). Suspension made by adding 4.5 c.c. saline to moderately long, 18 hours' growth on plain agar slant. Each rat given 0.003 c.c. of this suspension, per gram weight.

1. Inside Rachitic

Total Number	Number Dead	Weight (grams)	Dose c.c.	Per Cent Alive
7	7	75 (d)	.22	0%
		67 (d)	.20	
		65 (d)	.195	
		60 (d)	.18	
		54 (d)	.16	
		52 (d)	.16	
		52 (d)	.16	

These rats died 5, 6, 16, 16, 16, 16 and 40 hours after injection.

2. Mercury Lamp Rachitic

Total Number	Number Dead	Weight (grams)	Dose c.c.	Per Cent Alive
8	7	74 (d)	.22	12.5%
		72 (d)	.22	
		64	.19	
		62 (d)	.19	
		60 (d)	.18	
		56 (d)	.17	
		52 (d)	.16	
		51 (d)	.15	

These rats died 5, 5, 7, 7, 7, 16, and 16 hours after injection.

3. Sun-treated Rachitic

Total Number	Number Dead	Weight (grams)	Dose c.c.	Per Cent Alive
7	4	71	.21	43%
		68	.20	
		65	.195	
		62 (d)	.19	
		58 (d)	.17	
		54 (d)	.16	
		52 (d)	.16	

These rats died 5, 5, 7 and 29 hours after injection.

d = dead.

pared the susceptibility of rachitic rats: (1) exposed to the sunshine for the routine 2 hours per day (11 a.m. - 1 p.m.) for 4 weeks; (2) exposed for 15 minutes per day, 30 cm. from a quartz mercury-vapour lamp for 4 weeks; and (3) kept inside in an animal room in which the windows were opaque, and the door provided with a screen, so that no direct sunlight reached the cages.

Table II (B) gives the details of one of the eighteen experiments which are summarized in Table II (A).

Of 105 sun-treated rats, 44 per cent survived as compared with 25 per cent of the 103 inside rats. In two individual experiments, a greater percentage of inside than sun-exposed rats survived, but in the other sixteen experiments, the sun-exposed showed the higher survival rate. As 38 per cent of the 101 mercury-lamp rats survived, it is evident that they did not withstand the infection as well as the sun-exposed rats. In 4 of the 18 experiments the mercury-lamp rats showed the highest survival rate. These rats exposed to the mercury-vapour lamp have less marked rickets than the rats exposed to the winter sunshine, and if the increased resistance is due to the healing of the rickets, one would expect the mercury-lamp rats to do the best, unless in addition to its rickets healing power the mercury-lamp has an injurious effect on the rats. It is suspected that the fifteen minute exposures were too long, for when two small groups of rats were irradiated for 7½ instead of 15 minutes they showed a degree of resistance equal to that of the rats put out in the sun. From a study of the literature, also, it seems probable that short exposures of 5 to 10 minutes per week are more beneficial, at least to normal human beings, than more frequent and longer exposures.

The rats that were put out in the sun were also exposed to the cooler outside air and any benefit which they obtained from the latter environment might explain the higher resistance rate of the sun-exposed as compared with the mercury-lamp-exposed rats. To determine if exposure to the air affected their susceptibility, rats kept inside, rats put out in the open air but protected by a rough shelter from the sun, and rats put out in the open air and sun were compared. Table III gives the results of this series of 10 experiments. It is evident that the sun-

TABLE III

1. Inside Rachitic

Exposed to Sunshine for 4 Weeks	Total Number	Number Dead	Per Cent Alive	Average Weight (Grams)
January to May	65	33	49%	63

2. Outside Rachitic—No Sun

Exposed to Sunshine for 4 Weeks	Total Number	Number Dead	Per Cent Alive	Average Weight (Grams)
January to May	70	39	44%	60

3. Sun-treated Rachitic

Exposed to Sunshine for 4 Weeks	Total Number	Number Dead	Per Cent Alive	Average Weight (Grams)
January to May	72	26	64%	65

exposed rats survived in greater numbers than those kept inside. The survival rates of the rats exposed to the air alone varied greatly in the different experiments. In three experiments they withstood the infection better than the inside rats and not as well as the sun exposed, but for the rest, they died more frequently than either of the other two types. The variations did not correspond with changes in the temperature of the outside air. When the results from all the experiments were added up, it was seen that the rats exposed to the air alone did not show as high a survival rate as the rats kept inside. Consequently, it was concluded that the rats under the conditions of this experiment were not benefited by the outside air.

So far, most of the results had suggested that the increase in resistance ran parallel with the healing of the rickets. Whether a similar beneficial effect would follow the curing of the rickets by the addition to the food of small amounts of cod liver oil or irradiated ergosterol (which is vitamin D) was studied in the next group of rats. These experiments were not as satisfactory as the preceding ones, partly because for some reason the rats kept inside did not show marked rickets (some of the antirachitic food might have dropped through from the cages above), and partly because the results with the rats fed the antirachitic substances varied greatly in the different experiments. If the variations were overlooked and the total results of all experiments added up, it was seen that the curing of the rickets, whether by sunshine or irradiated ergosterol, raised the resistance equally well. Cod liver oil was less effective. These results are shown in Table IV.

TABLE IV

1. Inside Rachitic

Exposed to Sunshine for 4 Weeks	Total Number	Number Dead	Per Cent Alive	Average Weight (Grams)
April to June	37	19	49%	65

2. Inside Rachitic plus Irradiated Ergosterol

Exposed to Sunshine for 4 Weeks	Total Number	Number Dead	Per Cent Alive	Average Weight (Grams)
April to June	18	7	61%	64

3. Inside Rachitic plus Cod Liver Oil 2%

Exposed to Sunshine for 4 Weeks	Total Number	Number Dead	Per Cent Alive	Average Weight (Grams)
April to June	33	18	46%	71

4. Sun-treated Rachitic

Exposed to Sunshine for 4 Weeks	Total Number	Number Dead	Per Cent Alive	Average Weight (Grams)
April to June	50	19	62%	68

Similar experiments should be repeated and additional ones, embodying some improved technique for the administration of the antirachitic material, undertaken.

When rats fed a normal diet were placed out in the sun for the some two hours daily, they did not gain in weight as well as did similar rats given the same food but kept inside. At the end of the four weeks' treatment, these sun-exposed rats did not withstand the artificial infection as well as those kept inside. Apparently, therefore, exposure to the sun is not beneficial to normal rats. (See Table V).

TABLE V

1. Inside Normal

Exposed to Sunshine for 4 Weeks	Total Number	Number Dead	Per Cent Alive	Average Weight (Grams)
May and June	27	11	59%	85

2. Sun-Treated Normal

Exposed to Sunshine for 4 weeks	Total Number	Number Dead	Per Cent Alive	Average Weight (Grams)
May and June	25	14	44%	80

CONCLUSION

It has been found that exposure to the sun about noon for 2 hours daily during a period of 4 weeks markedly raises the resistance of young rachitic rats to infection. Of 263 sun-exposed rats, 57 per cent survived; and of 241 rats kept inside, 32 per cent survived. Normal rats, after such sun treatment, did not survive as well as similar rats kept inside. Exposure to the outside air with protection from the sun had no beneficial effect on rachitic rats. After these rachitic rats had been given treatments extending over 4 weeks' time, in which they were exposed at a distance of 30 inches from a quartz mercury-vapour lamp for fifteen minutes daily, they showed a higher degree of resistance than corresponding rats kept inside, but not as high as such rats put out in the sun. Fifteen minutes is probably too long an exposure for these animals. Rachitic rats, fed small amounts of irradiated ergosterol, are less susceptible to artificial infection than such rats that have been given no antirachitic treatment.

CHRONIC CARBON MONOXIDE POISONING*

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CARBON monoxide poisoning is one of our most serious health problems. It is widespread and difficult to cope with, and comparatively little has been accomplished so far in its prevention. Since the discovery of fire, it has been a menace to man, and, as time has passed, it has become of more and more importance, until to-day it is involved in his very existence. Aristotle[1] referred to coal gas as a cause of death, and Livy described wholesale executions by suffocation from the gases of fires. Its path through the middle ages has been traced. By 1500 A.D. the symptoms of poisoning were known, and its importance as an industrial poison was recognized, and in the eighteenth century accurate observations of its effects were published. These effects had often been attributed to the work of demons and witches. It was first artificially prepared by Lassone in 1776, and for a time was thought to be identical with hydrogen. Much has been done to combat the more familiar form of acute poisoning, though deaths are on the increase.[2] It is with the problem of chronic poisoning that this paper deals.

NATURE OF THE GAS AND ITS DISTRIBUTION

Carbon monoxide is a colourless, odourless, tasteless gas, non-irritating, and chemically inert, which is formed when incomplete combustion of organic matter takes place. Since combustion of fuels is far from complete, it follows that it is produced in large quantities and is widely distributed. It is present in the exhaust of all types of gasoline engines; it is formed when wood or coal is burned; it is found about blast furnaces, gas works, smelters, and in mines; it is produced in the firing of guns and in the explosion of military mines; it is even present in tobacco smoke. There are few industrial activities in which carbon monoxide is not encountered. The effects of chronic poisoning are insidious and slow in appearing, and depend upon exposure to low concentrations of the gas, extending over weeks or months. Damage may be done before the patient realizes he is in danger.

Carbon monoxide from automobiles on streets where the traffic is heavy is a menace to people in general. When one remembers that there is a motor car for every eleven people in Canada and for every five in the United States, with the number rapidly increasing, to say nothing of the many stationary gasoline engines in use, the extent of pollution of the air becomes apparent. Exhaust gas from the ordinary automobile contains 5 to 6 per cent of carbon monoxide. In the average private garage with the doors closed, and in which an automobile engine is running, a dangerous concentration of

* Read at the annual meeting of the Ontario Medical Association, Kingston, May 31, 1928.

gas is reached in three minutes, and asphyxiation may occur in five, followed by rapid death.[3, 4] The effect is much slower on the streets and in large public garages, where the concentration, although much less, may still reach a degree incompatible with health. In 1923, Henderson and Haggard,[5] investigating the conditions in city streets, found that a stationary car with the motor running filled the air behind it at respiratory level with four to six parts of carbon monoxide per 10,000 of air. When running ten miles per hour, the occupants of a car thirty feet behind were surrounded by exhaust gas diluted to a concentration of one to two parts of carbon monoxide. One part in 10,000 was a frequent condition in streets where traffic was heavy, and in unusually congested areas a higher amount was present. They also emphasized the point, worth noting in passing, that whereas gasoline itself gave an exhaust the only poisonous constituent of which was carbon monoxide, some motor fuels containing a high content of benzene and other related substances, produced toxic gases which were among the most harmful of vapours, causing a progressive and cumulative effect. They drew attention to the fact that the exhaust from motors was far more toxic than smoke from dwelling or factory chimneys. It seems safe to say, when one considers the increase in the use of automobiles and especially of large trucks and buses which everywhere belch out large amounts of exhaust gas, that the atmospheric content of carbon monoxide in city streets is greater to-day than in 1923. Wilson, Gates, Owen and Dawson[6] examined the blood of traffic policemen after an ordinary day's work and found that it contained in some instances as high as 30 per cent saturation with carbon monoxide, at which point mild subjective symptoms became apparent. Shumway[7] reported several cases of illness resulting from more or less constant exposure to exhaust gas under the usual conditions of city life.

The air in public garages having no artificial means of ventilation was examined by Ciampolini,[8] who found that it contained as high as 0.2 per cent of carbon monoxide. Many workmen showed 10 to 20 per cent saturation of their blood and suffered from signs and symptoms of chronic poisoning, as pallor, nervous and gastric manifestations, and insomnia. Apfelbach[9] described conditions about blast furnaces, in the illuminating gas industry, power gas industry, in the use of ovens, and among firemen and boiler operators. Conditions relative to automobile exhaust have been completely reviewed in a report[10] to the New York Academy of Medicine. Hayhurst[11] dealt with poisoning from gas stoves, especially those without flues, and Haldane[12] advised that not more than 20 per cent carbon monoxide be allowed in city gas in order to keep air pollution through small leaks below a dangerous level. The proportion of carbon monoxide[13] in industrial and domestic gases varies between 4 and 30 per cent; coal gas, 4 to 10 per cent; water gas, 30 per cent; producer gas, 20 to 30 per cent. Sundell[14] stated that more casualities occurred in the few days subsequent to the explosion of military mines than at the time of the explosion, as crevices formed in the earth became filled with gas which gradually seeped into adjacent workings. Rutherford[15] reported a mine explosion in 1916 after which gas issuing from the ground burned with a flame visible at a mile for five hours after the mine had gone up. Armstrong[16] analyzed undiluted smoke from cigars and cigarettes and found that it contained as much as 8 per cent and 1 per cent carbon monoxide respectively. Habitual smokers have shown a blood saturation as high as 6 per cent. In an investigation of the hazards from tobacco smoke, Jones, Yant, and Berger[17] found that after forty to sixty minutes smoking in a closed room of 1,000 cubic feet capacity, the carbon monoxide present was never greater than 0.2 per cent. The smoke was four to six times more concentrated than would be permitted under well ventilated conditions, so that the carbon monoxide would be no higher than on streets with heavy automobile traffic.

The importance of carbon monoxide in modern life is well illustrated by the ventilation problem in the Holland Tubes for automobile traffic under the Hudson river at New York. Were a direct draft used to clear them of gas and render passage safe for the occupants of cars, a current of fresh air having a velocity of 72 miles per hour would be required.

SIGNS, SYMPTOMS AND RESULTS OF CHRONIC POISONING

Many accounts of chronic carbon monoxide poisoning have been written, and those of McGurn[18, 19] are especially interesting. He described fourteen cases showing the pictures of toxic nerve irritations, combined cerebro-spinal

and peripheral nerve lesions, peripheral neuritis, permanent muscular weakness, cerebro-spinal irritations, chronic invalidism, petit mal, high blood pressure and vaso-motor disturbances, convulsions and cateleptoid stupor, insanity, glycosuria and pseudo-tabes, and multiple sclerosis. These cases were selected from among intelligent individuals, whose histories and co-operation could be relied upon, whom he was able to study intensively and follow carefully, and in whom he excluded hereditary and acquired disease which might obscure or complicate the diagnosis. He further said, "From these and from many other cases seen by the writer, it is apparent that the amount of gas necessary to produce the most profound nervous disorders is exceedingly small, indeed so small that many men and women of experience and education have been permanently injured, owing to the fact that they have failed to appreciate the grave dangers that always exist when coal gas or illuminating gas is inhaled in quantities sufficient to be detected by the normal sense of smell." Egdahl[20] listed the immediate symptoms of chronic poisoning as tingling and twitching of the limbs, irritability, numbness of the various parts of the body, feeling of weight in the chest, rigidity of the fingers and toes, attacks of shivering, extreme thirst, various subjective heart symptoms, distress and pain referred to the heart and respiratory distress, while objectively pallor, loss of flesh, red patches over the cheek bones, shiny glittering eyeballs, enlarged pupils, and irregular pulse were noted. Henderson and his associates[21] at Yale University, in their extensive study of the physiological action of carbon monoxide, described the early effects as follows, "But of all signs and tests the typical carbon monoxide, or oxygen deficiency, headache proved most definite and reliable. It is a distinctly localized pain, usually frontal, throbbing, intensified by lying down or exertion. It is sometimes accompanied by more or less nausea, readily increased to vomiting. The mind is not clear, except by an effort, and one's surroundings seem a little strange. The temper is easily upset, very much as in alcoholic intoxication, and the judgment is likely to be bad. There are wide variations in the degree of this headache, but in the experiments discussed in this section it was never extreme. On the border line it merged merely into slight lassitude. As a criterion of the effect of carbon monoxide, however, it is more distinct than any artificial test. Concentrations of gas too weak and periods of exposure too short to induce this sign in anyone may be considered entirely harmless." Luden[22] reported an interesting personal experience with the gas in her home, and referred to its peculiar action in adhering to objects as garments, rugs, bedding and furniture for lengths of time. The situation pertaining to poisoning in industry has been dealt with by Mayer[23] and by Hayhurst.[24] A consideration of what effect it may have on the not fully developed and growing tissue of infants and children would appear to be important,[25] as it is generally conceded that they are affected more rapidly than adults. On the other hand, McCombs[26] analyzed 1,000 cases of acute gassing but did not observe chronic sequelæ. Most other writers have laid particular emphasis on the occurrence of such sequelæ.

A finding of diagnostic importance is a rise in the number of red blood cells and in the amount of hæmoglobin, a compensatory mechanism to make up for the cells lost to the circulation through combination of their hæmoglobin with carbon monoxide. Karasek[27] examined the blood of operators in iron mills who were exposed to it but who did not show symptoms. Their blood showed a polycythæmia of 5,550,000 to 9,676,000 with hæmoglobin of 95 to 125 per cent, but with no morphological changes in the cells. Nasmith and Graham,[28] in an experimental study in which guinea pigs were exposed constantly to an atmosphere of carbon monoxide sufficient to maintain a blood saturation of 25 per cent, found a definite rise in the number of red cells and in the amount of hæmoglobin.

It is true that considerable tolerance to the effects of exposure is developed on the part of some individuals, and also that an amount sufficient to adversely affect some persons shows little or no effect on others. The effects vary in different individuals, suggesting a varying resistence of different parts of the body. In the literature[29 to 44] one finds many reports of cases of chronic carbon monoxide poisoning, showing a great variety of signs and symptoms. The protean manifestations of its action make it one of the most diversified of diseases.

PATHOLOGY

The pathological findings in patients dying of or a short time after acute poisoning are, as

reported by Stewart[45] and by Hill and Semarak,[46] of the nature of degenerative changes in the central nervous system and peripheral nerves. Stewart reported the histological examination of sections of brain, spinal cord, and peripheral nerves in a patient who died twenty-four days after gassing. He found intense universal myelin degeneration, bilateral softening in the basal ganglia, and a widespread cortical softening confined to the deeper layers of the grey matter, and concluded that the brunt of the damage fell on the central nervous system. Hill and Semarak in a series of cases found a bilateral ischæmic necrosis of the lenticular nucleus to be a characteristic lesion, and felt that carbon monoxide poisoning might be the cause of subsequent nervous and mental disease. They also concluded from the histological appearance of the capillaries that the endothelium was extremely vulnerable. The pathological changes in chronic poisoning are likely similar to these but varying in degree of damage. The diffuse and varied envolvement of the nervous system makes understandable the bizarre conditions observed clinically.

ACTION OF CARBON MONOXIDE

The manner in which carbon monoxide acts has been the subject of many investigations. Haldane,[47] in 1895, in his classical paper "The action of carbonic oxide in man," stated that, "the symptoms are due solely to deficiency in the oxygen percentage of the blood and are similar to those experienced by mountaineers and balloonists at high altitudes." Many writers have felt that there is a direct toxic action on tissue, but among physiologists the view of Haldane is generally accepted. The poisonous action of carbon monoxide is due to the fact that the ga combines with hæmoglobin, replacing oxygen. If completely saturated, the blood would hold the same amount of this gas as oxygen, that is, 600 c.c. Thus the blood is prevented from carrying the normal amount of oxygen and the animal dies, if the process has gone far enough, from want of it, or, if death does not take place, serious damage may be done to the tissues of the nervous system from the anoxemia induced. The symptoms of poisoning do not become appreciable during rest until the blood is about one-third saturated. An individual in this condition suffers from palpitation and throbbing of the head and is liable to become dizzy or faint on any exertion, such as that of ascending stairs, or on sudden exposure to fresh air.

Carbon monoxide has an affinity for the hæmoglobin of human blood about three hundred times greater than that of oxygen, and so readily displaces it. The reaction takes place according to gas laws and there is a definite relation between the proportion of carbon monoxide in the air and the extent to which it combines with the hæmoglobin of the blood of an animal which has been sufficiently long in such an atmosphere to allow the maximum blood saturation to occur. Many hours of exposure are required to produce this effect. In the average case of poisoning, the time during which the patient is exposed to the action of the gas is usually not long, as in accidental gassing in garages, in passage through gas-laden areas and in industrial accidents, and so these figures are not often applicable. Henderson and his co-workers[21] have shown that half the maximum saturation possible in a given atmosphere occurs, at rest, in about one hour's time, and these figures may be practically applied to problems of poisoning. The safe limit of contamination of air for a period of exposure of one hour or less has been placed by him at four parts carbon monoxide for 10,000 parts of air, giving a blood saturation of 16 per cent in 50 minutes, the same as would be reached with one part in 10,000 in many hours. This limit is considered safe for invalids and children as well as for robust adults. Such a standard is much higher than that advised by Haldane for the London tunnels, one part in 10,000, but as Henderson points out, the latter was for periods of much longer exposure, so that the two standards are in virtual agreement.

Rules arrived at by Henderson and his co-workers,[21] which may be applied to given situations, are, "When the time in hours multiplied by the concentration of carbon monoxide in parts per 10,000 equals 3, there is no perceptible physiological effect. When it equals 6, there is just a perceptible effect. When it equals 9, headaches and nausea are induced. When it equals 15 or more, the conditions are dangerous to life. If the volume of breathing is increased by exercise (even by slow walking and correspondingly more by physical work) the rate of absorption of carbon monoxide is increased proportionally. After return to fresh air, the

elimination of carbon monoxide through the lungs proceeds at a rate of 30 to 60 per cent reduction of the blood saturation per hour." It is seen that the gas has a cumulative action, a prolonged exposure to a low concentration having essentially the same effect as a short exposure to a high one. This is to be distinguished from the cumulative effect seen in chronic poisoning, which is rather the result of anoxæmia caused by frequently repeated gassing. The gas itself remains in the blood only a short time after the subject returns to fresh air. Sayers, Meriwether, and Yant[48] also studied the effect of exposure to low concentrations, and concluded that the rate of combination, while slow when the subject is at rest, was more rapid when active; that the rate of combination took place much more rapidly during the first hour of exposure than subsequently; and that high temperature and humidity caused more rapid union.

DIRECT TOXIC EFFECT OF CARBON MONOXIDE

Evidence has been brought to show that carbon monoxide under experimental conditions, may have a direct toxic effect on tissue. J. S. Haldane[49] proved that mammals could live on oxygen dissolved in their blood under high pressure, when almost all their hæmoglobin was combined with carbon monoxide. J. B. S. Haldane[50] caused death in rats under similar circumstances, by adding more carbon monoxide, showing that direct poisoning of tissue could occur, as the animals already had their hæmoglobin saturated and were living on oxygen dissolved in the plasma. Similar conditions do not, however, obtain in everyday life. Haggard[51] studied the growth of neuroblasts in the presence of carbon monoxide, and found that even in a concentration of 79 per cent no ill effects were observed in the growing nerve cells. In this respect the gas was as neutral as nitrogen. He concluded that carbon monoxide had no specific reaction with nerve tissue, but acted in the body only through the asphyxia, incident to its combination with hæmoglobin. O'Brien and Parker[52] determined its solubility in serum and plasma and concluded that the amount dissolved in cases of poisoning under ordinary conditions was so small that no allowance need be made for it. Stadie and Martin[53] showed that the presence of carbon monoxide altered the oxygen dissociation curve of hæmoglobin and lowered the partial pressure of oxygen in the capillaries, thus depressing the rate of its diffusion to the tissues. The anoxæmia is, then, not entirely due to a reduction of the oxygen of the blood, but also to a lessening of availability of that oxygen which is present. In this way a person whose blood might be half saturated with carbon monoxide would be in a very serious condition, whereas one who had half the usual amount of hæmoglobin as a result of anæmia or hæmorrhage would be in comparative safety. An individual having 15 or 20 per cent of his hæmoglobin saturated, a deficiency which, under ordinary circumstances, would be little noticed, suffers from a much greater degree of anoxæmia. Nasmith and Graham[28] exposed guinea pigs continuously for fifteen months in an atmosphere of carbon monoxide sufficient to cause a 25 per cent saturation of their blood. They said "Of the twelve guinea pigs originally placed in the gas chamber fifteen months ago, one died of old age after two months confinement, four died at one time through the carelessness of the attendant, one after seven months was transferred to fresh air again, and five have been killed for pathological study. None of the animals decreased in weight; on the contrary most of them gained. After the first few days, those living with 25 per cent of their hæmoglobin saturated with carbon monoxide appeared just as active and happy as those living in the air." It would seem from this that the gas is innocuous as far as guinea pigs are concerned, and these results probably indicate that small animals are not suitable for the investigation of chronic poisoning as seen in man. Zeigler[54] produced late mental and nervous symptoms in dogs by gassing them with illuminating gas. In all likelihood the nervous constitution of an animal determines the effect of carbon monoxide upon it, the higher being more susceptible than the lower. On the whole, there is little evidence that carbon monoxide exerts a direct toxic effect on nervous tissue under clinical conditions.

The term carbon monoxide is loosely used in the literature, except by laboratory workers. It is assumed to be the poisonous agent in various mixtures of gases. While it is certainly the main one, it may not be the only one. Haggard[51] showed that pure carbon monoxide had no effect on neuroblastic cultures, but he also showed that illuminating gas was toxic for them in concentration even as low as 0.1 per cent, and concluded that it contained another toxic substance.

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The toxicity of pure carbon monoxide, illuminating gas, exhaust gas from gasoline and exhaust gas from coal distillate, has been compared by Henderson and his associates[21] by gassing dogs to the point of death and examining the blood. With pure carbon monoxide, an average of 84 per cent blood saturation was found; with illuminating gas an average of 70 per cent, accompanied by nausea and vomiting which were lacking in the experiments with the pure gas; with gasoline exhaust, an average of 83 per cent, much similar to pure gas; and with coal distillate, an average of 62 per cent, nausea and vomiting more severe than with illuminating gas, and in addition a brownish tinge to the blood indicating a destructive influence on the hæmoglobin. Hamilton[55] referred to loss of consciousness in benzol poisoning with two or three parts of benzol in 100,000 parts of air, and in one instance death from typical benzol poisoning from exposure to one part in 10,000. It would seem quite probable that some of the effects of gas poisoning may be due to minute quantities of substances other than carbon monoxide, although without doubt the major effect is due to it.

PREVENTION

Since treatment is of little avail after the damage caused by chronic poisoning is done, the approach to the problem lies entirely in prevention. This consists in reducing in all ways possible our contact with the gas. In industry much is being done to protect workmen, but it is unlikely that anything will be done to protect the general public from such an ubiquitous source of carbon monoxide as the gasoline engine, until an enlightened public opinion demands it. A vertical exhaust, as a remedy, has been tested and proposed by Henderson and Haggard.[5] The heated gases, thrust upward escape into the air above the street and are rapidly carried away, but when expelled along the ground are chilled by the cold surface, mixed with the air by other vehicles, and lie in a poisonous layer at respiratory level. We do not allow furnace smoke to escape at street level. Why should we permit automobile exhaust gas to do so, especially when it is so much more dangerous than smoke from chimneys? In round-houses each locomotive has a chimney through which smoke escapes. It would seem possible for every garage to have an outlet in the roof through which exhaust gas thrown upward from a vertical pipe would escape to the outer air and so reduce the increasing death rate from accidental asphyxiation. It is not likely that motor car manufacturers of themselves will alter the design of cars to meet this problem.

Much carbon monoxide escapes into homes from leaky illuminating gas pipes and fixtures, and from poorly adjusted gas stoves, and is breathed by the occupants for long periods of time without the realization that it is present. Especially is this so when the sense of smell is not acute, as is the case with many people. Were careful inspection for leaking gas instituted as is made for uninsulated electric wiring, much of this would be eliminated. But the danger of fire from small quantities of gas being negligible, the incentive for inspection is lacking and will not be supplied until a realization of the health menace from carbon monoxide makes it imperative.

There seems little reason for the extreme anxiety shown by some writers, lest the production and accumulation of carbon monoxide seriously handicap or endanger our present civilization. A writer in *Science*[56] said, "There is probably more carbon monoxide produced during a severe lightning storm in a given locality than is emitted by our coke burners, gas engines and other sources in industry during much longer periods." Serious as is the problem and beset with difficulties not often encountered in public health work, there would appear to be no reason why it should not be met successfully.

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DERMATITIS VENENATA*

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DERMATITIS venenata is a very large subject. Newer work on the problem is clearing up the field, and the purpose of this paper is to offer and discuss a few examples of the dermatoses caused by external irritants. Emphasis will be placed on those coming under the classification of occupational or industrial, as these are the most important, economically, to the worker; and unless they are studied carefully, we cannot expect to get proper recognition from the employer or the compensation board. In England these cases are carefully investigated by the compensation authorities. Some states in the American Union do this also, while others depend on insurance companies, but in Ontario there is no adequate clause covering these cases, unless a definite injury precedes the attack, and then it is classed as an injury. Therefore, a very careful history must be taken of the patient's past, as well as present, environment. that the case may be properly presented if necessity arises. Although the treatment of the patient seems most important, yet the hygienic and prophylactic aspect of the case should be carefully explained to him, thus teaching him how best to avoid future attacks. Many of these patients have had recurrences, have been told that it was their blood, and are hard to persuade that blood medicine is unnecessary.

Going over my statistics roughly, I would estimate that about 20 per cent of cases seen in my practice are dermatitis, and fully 75 per cent of these would come under this grouping, either directly or indirectly; therefore an insight into the "why" is all important. R. P. White says, "As etiology disentangles the causal from the casual, we realize that there are comparatively few idiopathic or primary eczemas," and if the name of the offending irritant cannot be given, the terms "traumatic," "occupational," or "professional" should be prefixed. The all important point to remember is that in every occupation the worker is exposed to irritants, and every irritant can cause a dermatitis in a susceptible skin. This depends on the sensitivity of the individual epidermis or tissues exposed, and such a sensitivity can be acquired, similarly to that of horse serum and other proteins, by con-

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tinued contact with the toxin, and the breaking down of the patient's tolerance to it. This was demonstrated by Low with primula toxin, where a control skin suddenly became sensitive after many negative applications, and stayed so. It is a fact that once an epidermis is in a state of sensitiveness to a toxin, the tissues seem to lose their resistance to other toxins to which that skin has always been resistant; and may, on very slight provocation, develop a dermatitis secondary to the one existent. One of many illustrations of this occurrence was in a case of primula dermatitis of the hands in a woman who did washing, using a brand of soap chips which she had used for years, and suddenly an acute dermatitis developed on the base of the unhealed dermatitis, which was much more extensively distributed.

The diagnosis of these cases depends on the history of the patient, and the nature of his work and surroundings. Also, environmental changes about the time of the attack, such as a trip to the woods, a change of work, or a new brand of some substance used in the patient's daily contacts are of importance. For instance, the varnishing of a bathroom seat has been known to start a severe dermatitis of the buttocks. The changing of a brand of soap, new hair dyes, the introduction of synthetics, as turpentine, into the painting trades, and many other things which we might call unusual occurrences may have to be considered.

All this history should be obtained from the patient at the time that the examination of the primary and secondary lesions on the skin surface is being made; at the same time a complete idea of their distribution and duration should be obtained and an endeavour made to determine how the irritant got on the inflamed area. Careful questioning as to previous treatment will often reveal the cause of a generalized dermatitis due to such a drug as sulphur, which may have been applied by the patient to treat a scabies, or something advised by a friend as a cure for some irritant dermatitis where some soothing application might have improved it. This was demonstrated recently in a case of neurodermatitis, localized on the back of the neck, which was followed by a severe band-like dermatitis. For this a fur collar was blamed, unjustly in this instance, as there was a definite history of the severe outbreak following the original irritation just after the application of a paste that burned, which was used for two weeks. Soothing applications cleared up the "collar" dermatitis in a few days, leaving a typical lesion of neurodermatitis to be treated appropriately.

The exposed surfaces of the body are to be examined most carefully, and the sequence of development of the dermatitis noted. Dermatitis of the neck and face is usually due to the contact of a moist skin with the hands or some neck wear, though the hand epidermis may not show any lesion, being more resistant; we seldom see rhus dermatitis developing on the palms. A fur dermatitis, due to dye or barbes, may not occur unless the skin gets moist, or the fur wet from rain or snow; and it is our duty in these fur cases to explain carefully to the patient that it is not the fault of the fur, but of her own skin, and that the fur need not be destroyed. A well-known specialist precipitated a lawsuit against himself by naming a particular brand of soap, and I think the safest guard against such an occurrence is the proper explanation to the patient that it is the fault of his own skin or sensitiveness, except in cases where some special trauma is evident. The site of involvement, as hands, fingers, forearms, girdle area, and feet, usually has some significance.

These cases should be carefully differentiated from seborrhœal dermatitis of either the eczematous, lichenoid, or psoriasiform type, and from those diseases commonly known as erythematous, papular, vesicular and pustular eczemas. These last should be classed with the sensitiveness group for the most part, though the irritant may be of such simple nature that the victim is unable to avoid it, such as ordinary dust, chalk, etc.; the epidermis for some unknown reason is easily irritated by it, probably only after primary trauma, or perhaps through a loss of balance of the potassium and calcium salts, thus throwing the neurocellular mechanism out of equilibrium and increasing cutaneous irritability.

The rôle of the fungi in dermatitis should not be forgotten. Osborne has told me of a case of persistent so-called "squamous erythematous" eczema, in which he has found a fungus in the foot and body lesions, and has obtained positive inoculation tests with all the cultures he made. It should not be forgotten, however, that a fungus may plant itself on the skin surface, and not become active until the skin is inflamed or injured. This is beautifully illustrated in a case of Trow's, where a fungus was demonstrated in vesiculo-bullous lesions on the hands of a child, but these lesions were found to be

an iodide eruption from calcidin which was being administered.

Erythema multiforme, psoriasis, pitriasis rosea, and the primary rash of syphilis might confuse, but a proper history and careful examination of the patient,—and this does not mean examination of the lesions only, but of the whole skin surface, —will usually put us right.

Practically all flowers, plants, and trees contain active irritants to which someone is susceptible, and skin tests are of particular value in disclosing some of these offenders. An artefact should be suspected if our history and examination do not agree, and the lesion has no definite characteristics, and the neurological aspect of the case should be looked into; thereby some employer may be saved needless expense when a patient has injured his skin with chemicals, burns, etc., for purposes best known to himself.

Factories demand that a worker doing certain grinding operations shall wear protective glasses, and, to offset irritation of the skin of workmen in certain industries, the first requisite is to keep dusts, oils, and fumes from his skin; for if he is a good workman, he will perspire, and the moisture aids the irritant, either by softening the epidermis or acting as a solvent for the irritant. Stopping the irritant at its source would seem to be the most logical method of attack on the problem. Protective overalls, body washing, and change of clothes before leaving work, to rid the skin of any toxic substances, or in some trades, a bland ointment, might be used to keep off the toxin. Neutralizing agents in the bath, using the same principle as administration of Epsom salts in lead workers, is sometimes practical. Tomato peelers' dermatitis, probably due to an acid, is prevented by dipping the hands occasionally in a 1 per cent solution of sodium hydroxide, and then rinsing in water. All these preventive measures must be worked out for the specific irritant and industry concerned. In new industries the incidence is always higher than after protective measures have been adopted through necessity and tolerance has been developed by the workers.

Stokes' table of the objective signs of dermatitis are well exemplified in these cases, and they may pass through the whole scale of erythema, œdema, vesiculation, oozing, crusting, scaling, lichenification, fissuring, and hyperpigmentation.

The pathology is that of inflammation in its various stages and the path of entry of the toxin is either the follicles or through slight traumatisms.

The treatment of this class of dermatitis is that indicated for pruritus, exudation, and secondary infection, and these depend one upon the other. Pruritus invites scratching, scratching causes laceration and oozing; exudation on a warm skin is an ideal medium for the growth of skin cocci—so goes on a vicious circle and eventually a case of so-called eczema develops. It may well be imagined that a simple impetigo may simulate a dermatitis venenata at the start, and a dermatitis venenata may simulate an impetigo at a later stage.

The methods indicated are: to remove the cause if possible; then to soothe the pruritus, check the exudate, and endeavour to reduce the infective element, without injuring Nature's healing efforts. In the active exudative and irritant stage moist dressings of astringents, such as 5 per cent aluminum acetate are very helpful, or a painting with a one in ten dilution in water of ten per cent resorcin in alcohol. Building up the patient's resistance, and looking after any other body ailments is also indicated. There is no strict set of rules for any case, but the use of irritants, physical and chemical, is always contraindicated. Excessive sugar ingestion should be prohibited, as some of these cases have seborrhœal tendencies, and recent work has shown that increased sugar in the perspiration is conducive to bacterial and fungus growth.

As has been stated, nearly everything with which we come in contact may irritate a sensitive or susceptible skin, and scarlatiniform or morbilliform eruptions, mesh-like erythemas, erysipelatoid erythemas and purpuric lesions may arise, but I will not undertake to go into the specific types of reactions seen, and the many common irritants in this short paper. However, I trust this brief discussion on dermatitis venenata will impress you with the importance of the subject, that you may be ever on the lookout for these cases, for the sake of the profession and the welfare and protection of our patients.

Italy, and later, Spain and Germany, came under an Imperial Decree of 1224, according to which candidates for the profession of medicine were compelled to pass a public examination in Hippocrates, Galen, and Avicenna. They must have studied logic for three years (? our Arts course), medicine and surgery for five, and must have practiced under an expert for one year.

SOME OBSERVATIONS ON THE EFFECT OF BLUEBERRY LEAF EXTRACT IN DIABETES MELLITUS

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REFERENCES to various so-called insulin substitutes have appeared in recent medical literature. The term 'insulin substitute' is perhaps an unhappy one. To those familiar with the beneficial effects of insulin in diabetes, the search for a substitute for this potent remedial agent may seem unwarranted. The efficacy of insulin in the treatment of diabetes mellitus is indisputable. Its mode of administration, however, bears disfavour. No method of administering insulin has yet been successful except by subcutaneous injection. Hypodermic medication, continued day after day, with unremitting care and precision is objectionable for very obvious reasons. Moreover, insulin is a powerful drug which, if misused in the hands of patients, possesses potentialities of dire consequence. Hence, hope ever exists that some substance may be prepared which when taken orally is capable of exhibiting the desirable properties of insulin, but is devoid of its disadvantages. Such an ideal therapeutic agent is not yet available.

The amount of insulin absorbed from the gastro-intestinal tract has generally been considered too insignificant to be of any real value in the treatment of diabetes. However, the observations of Murlin and Hawley[1] suggest that pancreatic hormone replacement by this route may not be an impossibility.

In the absence of an insulin-containing product which is efficient when taken by mouth, it may not be amiss to investigate certain non-pancreatic preparations from the standpoint of a possible salutary influence upon the carbohydrate tolerance of diabetic patients. Remedies of this class which have received attention recently are synthalin and blueberry leaf extract. Synthalin, although it appears to offer certain possibilities, is apt to give rise to unpleasant toxic by-effects. Blueberry leaf extract seems to be harmless, but its proper evaluation as a factor in the treatment of diabetes has not yet been decided. The following data have a bearing upon this latter consideration.

PREVIOUS OBSERVATIONS

Experimental evidence points to the existence in many or all plants of a substance which affects carbohydrate metabolism.[2,3,4] The leaves of the blueberry plant are said to contain this ingredient in relative abundance, in a form which permits of extraction.

The physiological action of an extract prepared from blueberry leaves was first investigated by Mark and Wagner.[5] This investigation was soon followed by observations relative to its effect in depancreatized dogs.[6] The variable results obtained by these workers were explained by the demonstration of two antagonistic principles in their preparations. The one tended to raise the blood sugar, the other to lower it. An attempt was made to separate and purify the latter substance, and the resulting product was given the name myrtillin.

On this continent, the problem has been investigated chiefly by F. M. Allen,[7] who believes "that myrtillin plays some accessory part in carbohydrate metabolism and that, if properly used, it will prove valuable as an accessory factor in diabetic treatment." This contention was the outcome of experimental observations in totally and partially depancreatized dogs and in clinical cases of diabetes. The lives of depancreatized dogs were prolonged by the use of myrtillin. Fluctuations in the blood sugar under similar conditions were apparently not so marked, and the amount of insulin required by the animals was probably less than when no blueberry leaf extract was used. Even the largest doses were without evident toxic effects.

Allen was able to report on eighty-one cases of diabetes treated with the drug. In sixty of these, conditions were such as to permit of comparative studies. Beneficial results, attributable apparently to blueberry leaf extract, were believed to have been obtained in thirty-six cases of this latter group, as evidenced by their ability to tolerate a higher daily consumption of carbohydrate, to decrease the amount of insulin, or

TABLE I.

SUMMARY OF CASES TREATED WITH BLUEBERRY LEAF EXTRACT

Case No.	Age (yrs.)	Sex	Known duration of the diabetic condition	Relative Severity of the Diabetes	Before Blueberry Leaf Extract		After Blueberry Leaf Extract	
					Insulin (Units per day)	Total Carbohydrate* (G. per day)	Insulin (Units per day)	Total Carbohydrate* (G. per day)
1	70	F	8 months	Moderately Severe	30	86	0	98
2	43	M	2 years	Mild	20	130	8	130
3	16	F	18 months	Severe	50	110	16	150
4	53	F	5 years	Mild	0	93	0	93
5	61	M	4 years	Moderately Severe	38	99	15	114
6	49	M	1 year	Moderately Severe	40	113	45	113
7	29	M	8 months	Mild	0	108	0	128
8	77	F	3 months	Mild	0	80	0	130
9	30	M	9 years	Severe	75	99	80	97
10	12	M	5 years	Severe	52	81	55	73
11	60	M	1 year	Moderately Severe	20	94	40	94
12	40	F	? (Less than 2 years)	Mild	30	116	0	140
13	12	F	1 year	Moderately Severe	60	94	40	107
14	66	F	4 years	Severe	45	90	70	84
15	23	M	2 years	Moderately Severe	65	125	65	125
16	67	F	1 year (?)	Moderately Severe	20	98	0	98

*Total Carbohydrate Content of Diet = 100% C. + 58% P. + 10%F.

TABLE II.

CASE 16—MODERATELY SEVERE DIABETES IN AN ELDERLY PERSON, TREATED WITH INSULIN AND BLUEBERRY LEAF EXTRACT

Date	Diet				Urine			Blood Sugar (Mg. %)	Insulin (Units per day)
	Carb.	Prot.	Fat	Calories	Sugar	Acid aceto-acetic	Acetone		
1928									
4–7	?	?	?	?	++++	neg.	neg.	267	0
4–10	20	20	40	520	neg.	neg.	+	150	0
4–17	45	55	120	1480	neg.	neg.	trace	161	20
4–23	50	60	130	1610	+	neg.	neg.	186	25
4–30	50	60	130	1610	neg.	neg.	neg.	143	35
5–7	50	60	130	1610	+	neg.	++	182	38
5–10	50	60	130	1610	neg.	neg.	neg.	...	45
5–12	50	60	130	1610	neg.	neg.	neg.	90	35
5–14	50	60	130	1610	neg.	neg.	neg.	122	30
5–21	50	60	130	1610	neg.	neg.	neg.	116	20
5–26	50	60	130	1610	++	neg.	neg.	174	10
5–26	*Blueberry Leaf Extract Started.*								
5–28	50	60	130	1610	trace	neg.	neg.	...	20
5–31	50	60	130	1610	neg.	neg.	neg.	119	20
6–4	50	60	130	1610	Ft. trace	neg.	neg.	103	10
6–7	50	60	130	1610	neg.	neg.	neg.	...	6
6–9	50	60	130	1610	trace	neg.	neg.	108	3
6–14	50	60	130	1610	neg.	neg.	neg.	111	3
6–18	50	60	130	1610	neg.	neg.	neg.	119	0
6–22	50	60	130	1610	neg.	neg.	neg.	96	0
6–26	50	60	130	1610	neg.	neg.	neg.	...	0

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both. In general, the best results were obtained in the milder cases and in middle-aged or elderly patients. Myrtillin never caused hypoglycæmia, but rather tended to prevent hypoglycæmic reactions due to insulin. The beneficial effects, when obtained, were indefinite in duration, and seemed to be prolonged, after stoppage of the remedy, for from one to several weeks. This phenomenon was explained on the assumption of storage within the body. The mode of action of myrtillin in bringing about improvement in carbohydrate tolerance is unknown. It has been suggested that the active principle may be of the nature of a vitamine. In this regard, it is noteworthy that Mills[4] has recently obtained encouraging results in the treatment of diabetes with a vitamine-rich extract of various plants administered by mouth. His preparation, however, was without effect in depancreatized dogs, but it increased glycogen storage in the livers of rabbits kept on a constant diet.

FURTHER DATA

There are recorded here the results of the administration of blueberry leaf extract to sixteen patients with diabetes mellitus of varying grades of severity and varying lengths of duration. The extract was supplied in the form of tablets, 0.3 grm. each, one tablet being given one hour before meals. The results are summarized in Table I. The blood sugar estimations were carried out by the Folin-Wu method, upon blood samples obtained during the morning fasting state, unless otherwise designated. Apparently beneficial effects were obtained in nine cases(56 per cent). As noted above, Allen claimed beneficial effects in 60 per cent of a larger series of cases.

In Table I, the insulin dosage before the exhibition of blueberry leaf extract refers to the amount of insulin received by these patients immediately before blueberry leaf extract was started, not the maximum requirements of the

TABLE III.

CASE 2.—MILD DIABETES IN AN ADULT TREATED WITH INSULIN AND BLUEBERRY LEAF EXTRACT

Date	*Diet*				*Urine*			*Blood Sugar (Mg. %)*	*Insulin (Units per day)*	*Remarks*
	Carb.	*Prot.*	*Fat*	*Calories*	*Sugar*	*Acid aceto-acetic*	*Acetone*			
1926										
6–21	?	?	?	?	++++	+	+	330	0	
10–18	159	84	135	2187	neg.	neg.	neg.	...	0	
1927										
3–8	60	70	180	2140	+++	neg.	neg.	...	0	
5–28	60	70	180	2140	++	neg.	trace	...	10	
8–29	50	70	160	1920	neg.	neg.	neg.	...	20	
10–12	80	60	150	1910	Ft. trace	neg.	neg.	...	20	
12–5	85	50	160	1980	neg.	neg.	neg.	111	20	
12–13	85	50	160	1980	neg.	neg.	neg.	114	20	
12–21	*Blueberry Leaf Extract Started.*									
12–31	85	50	160	1980	neg.	neg.	neg.	...	16	
1928										
1–4	85	50	160	1980	neg.	neg.	neg.	119	13	
1–7	85	50	160	1980	neg.	neg.	neg.	...	5	
1–12	85	50	160	1980	+	neg.	neg.	130	5	
1–16	85	50	160	1980	+++	neg.	neg.	136	16	Pt. has "cold."
1–23	85	50	160	1980	neg.	neg.	neg.	119	27	Pt. has "cold."
2–8	85	50	160	1980	neg.	neg.	neg.	...	36	Pt. has "cold."
2–15	75	50	160	1940	neg.	neg.	neg.	...	40	Pt. has "cold."
2–21	75	50	160	1940	neg.	neg.	neg.	133	23	
2–27	75	50	160	1940	neg.	neg.	neg.	122	15	
3–3	75	50	160	1940	neg.	neg.	neg.	...	10	
3–15	85	50	160	1980	++	neg.	neg.	142	5	
3–20	*Blueberry Leaf Extract Stopped.*									
3–27	85	50	160	1980	neg.	neg.	neg.	133	8	
4–2	85	50	160	1980	neg.	neg.	trace	166	8	
4–8	85	50	160	1980	++++	neg.	trace	183	8	

individuals previous to this time. The insulin dosage after blueberry leaf extract indicates the minimum amount of insulin needed after the use of the tablets. For example, the case record epitomized in Table II shows that an attempt was made to reduce the daily requirement of insulin to a minimum while maintaining the urine aglycosuric and the fasting blood sugar normal, first without blueberry leaf extract, and afterwards with blueberry leaf extract. This patient, on admission to hospital, presented the manifestations of moderately severe diabetes. The diet and insulin were as indicated. The insulin was gradually reduced, from a maximum of forty-five units per day on a constant diet to twenty units without glycosuria and without elevation of the fasting blood sugar. But when the insulin was further reduced to ten units per day, glycosuria appeared and the blood sugar rose above the normal. The patient was again given twenty units of insulin a day, and blueberry leaf extract was started. After about one week, reduction of the insulin was once more attempted. The insulin could now be eliminated entirely, the urine still keeping sugar-free and the blood sugar normal.

Considerable variations in effect were encountered in different patients and in the same patient at different times. Such discrepancies were referable, perhaps, to variations in potency of several lots of tablets or to vagaries in absorption. The effects of the remedy were lost in the presence of even a slight infection (Table III.) Ketosis was not readily corrected by the drug (Table IV). As regards the inhibiting effect of blueberry leaf extract upon hypoglycæmic reactions, it may be said that blood sugar concentrations as low as 0.047 per cent have been observed during the period of its administration, without the usual manifestations of insulin shock.

TABLE IV.

CASE 3.—SEVERE DIABETES IN A YOUNG PERSON TREATED WITH INSULIN AND BLUEBERRY LEAF EXTRACT.

Date	*Diet*				*Urine*			*Blood Sugar (Mg. %)*	*Insulin (Units per day)*	*Remarks*
	Carb.	*Prot.*	*Fat*	*Calories*	*Sugar*	*Acid aceto-acetic*	*Acetone*			
1927										
9–21	?	?	?	?	++++	+++	+++	316	0	Weight, 92 lbs.
9–29	70	35	120	1500	neg.	neg.	neg.	124	60	
10–2	70	40	140	1700	++	neg.	neg.	...	85	
10–10	70	40	170	1970	neg.	neg.	neg.	200	70	
1928										
1–13	70	50	160	1920	neg.	neg.	++++	166	50	
1–13	*Blueberry Leaf Extract Started.*									
1–20	70	50	150	1830	+++	trace	++	172	40	Weight, 110 lbs.
1–27	70	50	150	1830	++	neg.	neg.	168	40	
2–10	70	50	150	1830	neg.	neg.	neg.	128	40	
2–17	70	50	150	1830	neg.	+	+++	94	30	
3–2	80	50	150	1870	neg.	+	+++	132	20	
3–9	80	50	140	1780	neg.	trace	++	105	20	
3–16	90	55	130	1750	neg.	+	+++	103	18	
3–23	100	45	140	1840	neg.	neg.	neg.	129	16	
3–23	*Blueberry Leaf Extract Stopped.*									
3–30	100	55	140	1880	++	neg.	neg.	140	16	
4–6	100	55	140	1880	+++	neg.	trace	164	16	
4–6	*Blueberry Leaf Extract Re-started.*									
4–13	100	55	140	1880	++	neg.	+	95	16	
4–20	100	55	140	1880	neg.	++	+++	149	18	3:30 p.m.
5–4	95	55	130	1770	Ft. trace	neg.	+	69	20	
5–11	95	55	130	1770	neg.	neg.	neg.	100	18	
5–18	*Blueberry Leaf Extract Stopped.*									
5–25	95	55	130	1770	neg.	neg.	neg.	82	20	
6–1	95	55	130	1770	trace	neg.	neg.	85	20	
6–8	95	55	130	1770	+	neg.	neg.	108	25	Weight, 117 lbs.
6–15	95	55	130	1770	++	+	+++	71	30	3:00 p.m.

But reactions have not been absent. The effects could not be appreciably augmented by giving double the usual dose.

DISCUSSION

The above results, based upon purely clinical observations, would seem to support Allen's view that blueberry leaf extract has a stabilizing influence upon the carbohydrate tolerance of certain cases of diabetes. That it cannot take the place of insulin need not be gainsaid. But, if it can be shown to permit the dosage or frequency of administration of insulin to be decreased, or cause insulin to be eliminated entirely in certain cases, or allow for added carbohydrate intake without increasing insulin, its use is justified. Judgment regarding the value of a therapeutic agent of this sort is truly difficult and one must weigh the evidence carefully before arriving at conclusions. The fallacy of basing opinions upon a small number of observations is also realized. As everyone familiar with the malady knows, the course of diabetes is variable. There exist all grades of severity between the case which can be readily controlled by minor dietary restrictions and that which cannot be balanced even with large doses of insulin. That carbohydrate tolerance does improve as a result of, or in spite of, insulin is common experience. An example is shown in Table V, in which the daily amount of insulin was reduced from fifty-five units to zero in the course of about eight weeks. Had any treatment been employed other than that which was used in this case, one might have been led to quite erroneous deductions.

Tangible evidence in favour of the regeneration of pancreatic islet tissue as a result of insulin has been furnished by Boyd and Robinson.[8] It is also true that the daily insulin requirements of many patients remain unaltered or even need to be increased. Such cases have been reported by Newburgh[9] Harrison[10] and Brace.[11] Efficient diabetic therapy is a composite process to which many factors contribute. Whereas insulin acts as a specific under certain conditions, the mainstay of diabetic treatment still lies in the realm of dietary regulation. The importance of undernutrition has been emphasized by Rabinowitch.[12] Other factors which are known to influence carbohydrate metabolism in the diabetic, such as muscular exercise, infections, an altered basal metabolism, and time, should be given their proper due in any individual case.

Therefore, one may justly ask the following questions: Was the association of blueberry leaf extract administration and improvement in carbohydrate tolerance in the cases above mentioned merely a matter of chance? Could the recuperation of the metabolic functions be accounted for by one or several of the factors to which reference has just been made? Were these patients, at the time the blueberry leaf

TABLE V.

CASE J.P., MALE, AGE 27.—INSULIN REDUCED FROM 55 UNITS PER DAY TO ZERO WITHOUT BLUEBERRY LEAF EXTRACT.

Date	*Diet*				*Urine*			*Blood Sugar (Mg. %)*	*Insulin (Units per day)*	*Remarks*
	Carb.	*Prot.*	*Fat*	*Calories*	*Sugar*	*Acid aceto-acetic*	*Acetone*			
1927										
8–16	?	?	?	?	++++	neg.	+++	333	0	Admission to Hospital, Weight, 137 lbs.
8–19	20	30	60	740	+++	neg.	+	168	45	
8–23	25	50	75	975	trace	neg.	+	158	45	
8–27	30	60	90	1170	neg.	neg.	neg.	...	55	
9–7	60	70	125	1645	neg.	neg.	neg.	181	45	
9–17	70	70	150	1910	+	neg.	neg.	150	45	
9–24	90	70	160	2080	neg.	neg.	neg.	120	50	
9–29	90	70	160	2080	neg.	neg.	neg.	...	35	
10–3	90	70	160	2080	neg.	neg.	neg.	128	15	
10–10	90	70	160	2080	neg.	neg.	neg.	114	5	
10–20	90	70	160	2080	neg.	neg.	neg.	95	0	
11–15	90	70	160	2080	neg.	neg.	neg.	...	0	
1928										
1–28	75	60	170	2070	neg.	neg.	neg.	...	0	Weight, 151 lbs.
2–8	75	60	170	2070	neg.	neg.	neg.	114	0	
3–2	75	60	170	2070	neg.	neg.	neg.	...	0	

was started, receiving more insulin than their required minimum? These are, of course, all possibilities. The only reply to such speculations is that in several instances unsuccessful attempts at insulin reduction or dietary increment had been made before blueberry leaf extract was given; also, there were indications in certain cases of a decline in carbohydrate tolerance when the extract was withdrawn.

If a preparation, such as that under consideration, possessing possible insulin-like properties, is to be available for general use, some means of standardization is necessary. To date, a satisfactory method for this purpose does not seem to have been evolved; hence, a uniformly potent product can not be assured.

SUMMARY AND CONCLUSIONS

A limited experience with the use of blueberry leaf extract in the treatment of diabetes mellitus permits the following generalizations, in which the claims of Allen have been at least partially verified:

1. Blueberry leaf extract appears to exert a beneficial effect in certain cases of diabetes. Its action is not consistent.

2. Its utility is most apparent in middle-aged or elderly patients, and in mild cases of the disease.

3. Owing to its relatively slow and feeble action, the drug is of no avail in the emergencies or complications attendant upon diabetes.

4. Blueberry leaf extract can not be regarded as a substitute for insulin, generally, but it may become an adjunct in the treatment of diabetes.

5. Blueberry leaf extract is without evident deleterious effects. It does not give rise to serious hypoglycæmia.

6. Withdrawal of the drug may be accompanied by a partial relapse in carbohydrate tolerance after a variable length of time.

7. Finally, blueberry leaf extract has, at best, a limited application in the treatment of diabetes, and exaggerated confidence in any therapeutic agent is to be deprecated.

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An Address

ON

ASTHMA*

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ASTHMA is a constitutional disease with an hereditary tendency. That it is constitutional is shown by the manner in which it may recur after an absence of several decades. The hereditary factor is also well established. It is as fitting to speak of an asthmatic constitution as it is to speak of a melancholic disposition. If one regards the asthmatic as one who is capable of having asthma it is hardly an exaggeration to say "Once an asthmatic, always an asthmatic."

Since Sir John Floyer published his classical treatise in 1698, spasm of the muscles of the smaller bronchi has been taken as the cause. Kessler recently did experiments to substantiate this, but other investigators state that the cause is not so certain and that probably œdema of the epithelial cells lining the bronchi produces the narrowing. I have tried to demonstrate spasm by means of lipiodol injections into the lung but have not been successful. There was no apparent difference in the width of the shadow during an attack compared with its width during the freedom from asthma experienced after injection of adrenalin. Cocainization of the throat for

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lipiodol instillation will in itself usually relieve the attacks and it is difficult to keep much lipiodol in the bronchus on account of the irritable cough most asthmatic patients have. I have made a direct observation of the bronchial mucosa through a bronchoscope at Dr. Haslinger's clinic in Vienna. The bronchi are filled with tenacious bubbling mucus and the lumina of the larger visible bronchi narrowed only in the same degree as when a patient not subject to asthma coughs. The mucosa has exactly the same appearance as the nasal mucosa in hay-fever. The membrane is of a deep red colour, with a few paler mottled areas. It is definitely swollen and a probe sinks into it more deeply than in the normal. It is normal between the attacks. Postmortem studies of patients who have died from acute asthma confirm this. The cilia are absent from the epithelial cells, and the submucosa is very œdematous. The heart is normal. The evidence is more definite that this vasomotor swelling of the epithelial and subepithelial tissues, together with the increased viscid secretion from the mucous glands, is a cause of bronchial narrowing rather than muscular spasm of the bronchioles.

While we are very familiar with many of the external phenomena of asthma, we do not know either its true nature or its fundamental cause. Research here may some day open up to us better means of treatment, but for the present, the management of the disease is of more immediate importance. I must here confess that I have not been able to duplicate the good results published in many of the journals and recent text-books no medicine. One of the most difficult of problems is to establish a therapeutic fact in the case of a non-fatal disease. A glance at the pages of medical history shows us how frequently even the great masters in medicine saw the results they wished to see following some method of treatment which we know now could have had no effect whatever on the course of the disease. One thing is certain, in speaking of the result of treatment in asthma we should banish the word "cure" and speak of "freedom from symptoms," for one year or five year periods, and with this we should be ever mindful that asthma is a disease in which the most unexpected remissions occur spontaneously, especially in the young.

As asthma varies enormously in its severity and persistence, a classification may help. From the standpoint of management a classification according to age is probably the most useful. The first group comprises babies up to three years of age; the second group, from three to thirty-five years; and the third group over thirty-five.

These types of asthma and their necessary investigation can be best illustrated by typical cases.

CASE 1

D. A., a baby three weeks old, developed, in September, 1922, a generalized, weeping eczema. His family history showed some member to have had asthma or hay fever for the past five generations. He gave positive cutaneous reactions to egg and both human and cow's milk. As restricting the mother's diet in the matter of eggs and cow's milk did not help him, he was weaned and put on dried milk. With this he showed an appreciable improvement, but a definite eczema remained. Ointment made up of 25 per cent tar produced a good result, so that during the following summer only a few eczematous areas remained on the hands and face. In November, 1923, he developed bronchitis and asthma. Cutaneous protein reactions at this time were still positive to egg, but negative to milk. He now showed additional reactions to rabbit hair and duck feathers. Rabbit hair is frequently used in mattresses, but placing him in a special room away from contact with hairs and feathers produced no change. We expected that it would. A course of protein desensitization gave relief in about six weeks. He had only very slight attacks until 1925, and his mother then noticed that bananas were a cause of his attacks. Although he still showed a slight cutaneous reaction to duck feathers and rabbit hair he showed no reaction to banana protein. The mother then gave a small amount of banana on two occasions and asthmatic attacks followed each feeding. He had attacks apart from taking bananas, however. After a further course of desensitization with rabbit hair and duck feathers, and by avoiding bananas, he has remained well until the present.

Tonsillectomy and adenoidectomy do not seem to help such cases. For one that is improved another is made worse. Ephedrine, in quarter grain doses, usually gives satisfactory relief for six hours, but it causes constipation. Tar ointment is a valuable adjunct in the treatment of eczema. The administration of cod liver oil or one of the vitamin D concentrates is a useful prophylaxis for the bronchitis which aggravates the asthma.

CUTANEOUS REACTIONS TO PROTEINS

The protein reactions may be discussed here. The procedure is simple and requires about an hour. Keep the groups of the protein vials in envelopes labelled "vegetables," "meats," "milk," and "eggs," etc. Make a series of small scratches on the arm of an adult or the back of an infant so as barely to draw blood. Place a small drop of one-tenth normal solution of sodium hydroxide beside each scratch. Take, on the end of a toothpick, a small amount of powdered protein from the vial and place it in the scratch, rubbing in the sodium hydroxide to dissolve the protein. Place in a row the vials from which the proteins have been removed, separating each group, such as vegetables, meats, etc., with a toothpick.

Make a penmark at the end of the corresponding group of inoculated scratches on the arm. In this manner one can locate the protein causing the reaction. The reactions occur in five to ten minutes as white raised wheals surrounded by a red blush. It is well to note the size of the wheal. The larger it is, the more definitely is the cause established.

The list of proteins need not be large. If one employs more than one hundred in a large series of cases, eighty per cent of the reactions will be given by less than two dozen of our commoner foods and hair or feather dusts. The most important foods are eggs, milk, and wheat. These three foods give more reactions than all other foods. Of the animal emanations, horse, dog, cat or rabbit hair, and feathers of the chicken, duck and goose, are the main offenders. The pollens vary according to the locality. June grass, timothy, and ragweed are the most troublesome. Practitioners will find the following list of thirty valuable:—whole egg, cow's milk, wheat, oats, potato, cabbage, lettuce, beans, tomato, orange, peanut, beef, mutton, chicken, salmon, herring, codfish, cocoa, horse, dog, cat and rabbit hair, chicken, duck and goose feathers, orris root, June grass, timothy, ragweed low and tall, with sagebrush added for the western provinces.

If one wishes to employ a very complete list he may add the following forty-seven to the above list:—sub-proteins of egg, ovomucoid, ovo-vitelline, egg white, egg yolk; sub-proteins of cow's milk, casein, lactalbumen, peptone, and proteose; sub-proteins of wheat, leucosin, gliadin, glutenin, globulin, and proteose; beet, tea, celery, cauliflower, rice, veal, pork, white-fish, lobster, apple, banana, pear, walnut, paprika, mustard, mayonnaise, cow hair, muskrat, fox, cottonseed, flax, sheep's wool, glue, tobacco. Pollens will vary according to locality, but the most frequent reactions will occur with willow, maple, red top, orchard grass, rye grass, dandelion, marsh elder, cocklebur and wormwood. When using a very extensive list of 275, less than one per cent of the reactions of any importance will occur outside of the above list.

If a patient complains that house dust will cause attacks, enough of the floor sweepings to fill a thimble may be dissolved in twice its volume of one-tenth normal sodium hydroxide, and after allowing several hours to effect solution, shaking, and then centrifuging, the supernatant fluid may be applied to a scratch. If a reaction occurs and it is impossible by means of vacuum cleaners, etc., to keep the patient away from house dust, any biological laboratory will prepare suitable sterile extracts for treatment from a sample of the dust.

From the standpoint of diagnosis and treatment cutaneous protein tests are useful in children and young adults. They rarely give information in patients past middle life and autogenous vaccines should be the mainstay of treatment. In the past, many attacks of asthma in babies were diagnosed as croup and bronchitis. Where asthma is present there is frequently a concomitant eczema. These conditions, while fundamentally inborn, are very much aggravated by certain proteins, principally those in the food, though house dust may at times be a cause.

If a nursing baby be sensitive to a protein such as egg-white, its asthma will be aggravated by eggs in the diet of the mother. Although infants suffering from eczema and asthma usually show cutaneous reactions to egg and milk and other food proteins, they do not always improve when their diet is adjusted to avoid the substances. In these who are hypersensitive to foodstuffs, the reactions to hair and feathers frequently develop later. The many very strong reactions to horse hair are difficult to explain from the standpoint of previous exposure to that substance. Only three out of four babies will show any reaction to an extensive list of more than one hundred proteins. Hypersensitiveness to proteins and the cutaneous reactions frequently disappears spontaneously at about the age of three years. The reactions sometimes vary from month to month. Among those who show reactions, an acute bronchitis, such as occurs in the winter months, frequently initiates the attacks.

Protein reactions in infants may frequently be determined by a careful history A child usually vomits shortly after taking food to which it is very hypersensitive, or it may break out in a rash twenty-four hours after taking such a food. However, where small amounts are taken, or where the food is a daily one, such as bread and milk, and the parents not very observant, it is well to test for and exclude from the diet all food to which the child is hypersensitive, and to keep it from contact with hairs, feathers or dusts which give reactions.

Do not think that protein-sensitization, diagnosis and treatment are the beginning and the end in the management of asthma. This phenomenon has been investigated by modern methods only within the last ten to fifteen years. It is, there-

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fore, relatively new. As with everything new, the reports of results have been too optimistic. The protein-sensitization test has, however, established a definite place for itself in the diagnosis of asthma. It may be used to confirm the truth of the statement from a patient that eating a certain food, or contact with a certain dust, will produce an attack. More frequently, substances that the patient did not suspect will be demonstrated as an exciting cause. The effect may be proved by actual contact later.

The following is a case in which cutaneous reactions and desensitization proved valuable.

CASE 2

H. R., a female, 29 years old, referred by Dr. F. A. Benner, had had asthma for the past twenty years. Until the age of eighteen years she had lived at Maple Creek, Sask., a settlement with a high and dry location. After that she lived for ten years in Edmonton, and had been in Winnipeg less than a year. She was almost a chronic invalid, having very severe asthmatic attacks daily, and only through remarkable will power and four or five daily hypodermic injections of adrenalin was she able to continue her work as a stenographer. Having an acute perception, she was able to state definitely that horses, dogs and cats make her break out in "nettle stings" and make her asthma worse. Sage brush, which pollinates in the fall, would also aggravate it. She was given a course of desensitization to horse and dog hair for over four months. She did not improve for the first two months, but after that the attacks became less severe, until by the end of the treatment she was almost entirely free from symptoms. Only by a brisk walk against a cold wind could she start up a wheeze. After six months she began to notice a slight return of the asthma on hot days. The protein tests now showed the reactions shown in Fig. 1. They were twice this size before the course in desensitization. On account of the horsehair reaction now being so much larger than the others it was used in combination with sagebrush pollen for a second course in desensitization. This should give an added period of freedom from asthma, but it is impossible to forecast whether or not this patient will be free from asthma in old age.

FIG. 1.—Cutaneous protein reactions following four months of desensitization in patient No. 2. They were twice this size before the course of injections.

DESENSITIZATION

Before undertaking a course in desensitization every effort should be made to keep the patient away from food or substances which cause his symptoms. The physician should give the patient explicit instructions and, if this does not result favourably, he should visit the patient's home in the rôle of a Sherlock Holmes to ferret out materials which might be a cause. If this is successful, even occasionally, it repays many unfruitful efforts. Desensitization is time consuming; it is not a pleasant procedure for the patient; and it involves considerable expense. However, desensitization may be the only way out, as when the offending substance is ubiquitous and likely to meet the patient in many places he cannot avoid. It is justifiable to desensitize a farmer to horsehair emanations if he cannot engage in any other occupation. The aim in desensitization is to establish a tolerance by means of gradually increasing doses of a substance to which the patient is hypersensitive. In patients who are markedly hypersensitive, especially to the animal emanations, desensitization is very slow and never complete. A partial desensitization, however, will permit a patient to come in contact with small amounts of the offending substance, without developing symptoms. If hypersensitive to horses such a patient may drive behind them, though he cannot groom them. A year after desensitizing some tend to become as hypersensitive as they were originally. The patients with large reactions manifest the best results from desensitization. Patients who show wheals less than an eighth of an inch in diameter frequently do not benefit from such treatment. From multiple reactions the largest of each group should be combined for desensitization treatment. The directions given by the biological houses with desensitizing protein solutions are satisfactory, but it is frequently necessary to continue for some time with larger doses than advised of the stronger solutions, in order that sufficient tolerance may be developed. One minim of a 1-10,000 solution of the protein is the usual dose with which to commence treatment, but it is best to put a drop of the 1-10,000 solution in a scratch, and, if the

wheal is more than ½ inch wide, to give one tenth of the dose by diluting the 1-10,000 solution.

For the first half dozen doses, each may be twice the previous one. Later it is best to increase in slower steps by having each dose one and one-half times that of the previous one. *One cardinal principle is that the injections should not be so large that they give the patient asthma* If the symptoms are worse within six hours after the injection the dose is too large and should be decreased to half the last given and increased at half the rate suggested above. The local reaction should not be over three inches in diameter and it should start to fade in six hours. Walker originally gave injections at weekly intervals, but Duke has recently obtained good results using only a daily interval. Three injections weekly at first and later twice weekly are satisfactory.

The course of injections should be continued for two to three months or until the patient can tolerate one c.c. of a one per cent solution. This may require a long time, especially in a patient who is very sensitive to animal hair. Following this one may continue with monthly injections of the last dose for a period of one year or repeat the course if the symptoms recur, which is frequently the case in a year or two.

We do not know what the remote results of desensitization may be. Only after it has been in use for a lifetime can we determine whether the treatment in childhood tends to prevent asthma in old age.

Drugs do not interfere with desensitization, so that one may give ephedrine or adrenalin for immediate relief. Ephedrine is always worth a trial in a patient who is protein-sensitive. It rarely gives relief to elderly patients who have a continuous type of asthma. It can be taken by mouth and its action is more prolonged but less certain than that of adrenalin.

A change of climate, always an expensive experiment, does not benefit protein-sensitive patients if they are exposed in their new locality to the protein to which they are susceptible. A change of residence to a new house a hundred yards away or to a sparsely furnished hospital room will remove the patient from the source of trouble and often give as much relief as a haphazard journey of a thousand miles.

About 60 per cent of asthmatic patients from 3 to 35 years of age show protein reactions. One can, by a history, frequently distinguish patients who are protein sensitive from those who are not. Those protein sensitive have little or no purulent bronchitis. They have definite attacks, lasting several hours to several days, and then definite remissions, when they are entirely well. The attacks are usually associated with a definite location or occupation and the onset is characterized by sneezing. The non-sensitive types have a more continuous asthma. The onset is usually from two to five in the morning. Patients hypersensitive to feathers usually develop attacks within an hour after going to bed. The non-sensitive are usually past middle life and are very much worse during an attack of acute bronchitis. Many elderly patients who show no reactions give a very distinct history of being, in their youth, hypersensitive to specific substances such as horsehair.

Out of three patients showing the protein reactions one will obtain *no* relief from his asthma by abstaining from the substance to which he is hypersensitive or by a course in desensitization. Another will have a stubborn respiratory infection and there is little relief by desensitization. The third will have marked relief by desensitization for a period varying from one to three years and a repeated course of injections will frequently extend this period. This is the type of case that encourages one to do protein tests and desensitization. The patient not showing any definite protein reaction should be treated in the same manner as asthma in the elderly.

Asthma in old age is the least hopeful of all types. It is usually continuous and associated with a bronchitis which is worse in winter. Cardiac, renal and aortic dyspnœa (so-called asthma) should be excluded by careful physical examination.

CASE 3

D. M., 58 years of age, is a good example of this type. He entered the General Hospital, under the care of Dr. E. S. Moorhead, complaining of weakness, asthma, cough and expectoration. This patient had been suffering from asthma for twenty-four years. He came to Canada from Scotland, eighteen years ago, in search of health. He has not yet found it. He had had asthmatic attacks two or three times a week during all these years. For the past four years the attacks had been more frequent, until they came on whenever he exerted himself, even moderately. Since 1922 he had frequently coughed up small amounts of blood in the morning, and for the last year his sputum had been more than six ounces daily, of thick yellowish material. He had had considerable pain in his right side, aggravated by coughing and deep inspiration, and had lost so much weight that he appeared to be quite wasted. His chest was prominent, with the right shoulder lower than the left. There was considerable bowing of the spine, both posteriorly and to the left, and examination of the lungs showed relative dullness due to old tuberculosis in the right apex and marked active pyogenic disease at the base. The bronchus was pulled to the right and lipiodol did not penetrate the base of the lung but floated

on the surface of the purulent material in the dilated bronchioles. The heart, kidneys and other organs were normal.

Such a patient as this does not show cutaneous reactions to proteins, and one must have recourse in treatment to an autogenous vaccine made from the sputum.

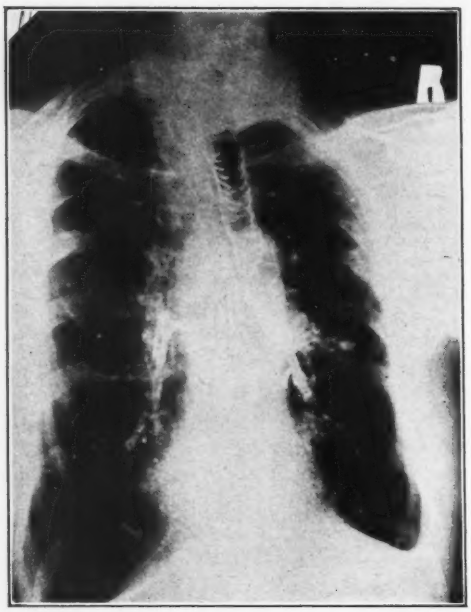

FIG. 2.—X-ray of chest of asthmatic patient No. 3 with lipiodol injection. Advanced disease of right lung; moderately advanced disease of left.

However, a vaccine did not help this patient, nor did he obtain symptomatic ease from stramonium cigarettes, as many do. As palliative measures he was given occasional doses of adrenalin hypodermically; luminal at times, for sleep; and a prolonged course of potassium iodide, 10 grains daily. In the continuous type of asthma, associated with bronchial infection, 5 to 10 grains of potassium iodide gives the highest percentage of relief to be obtained from any drug. It renders the tenacious sputum more liquid, and also has a sedative action. Morphine was not necessary for this patient. He showed little or no improvement on treatment, but became somewhat easier during the warm weather and in the sunshine of May and June. As non-specific treatment he is now taking hypodermic injections of Koch's old tuberculin, beginning with 1 minim of a one in a million dilution, which will be repeated in increasing doses at five day intervals.

Not much benefit is to be expected in asthma from non-specific protein therapy. This patient will probably have a marked acute exacerbation next fall and winter. Such cases are sometimes benefited by a warm, dry climate.

Much effort should be concentrated on helping and preventing bronchitis and bronchiectasis. We have been draining sinus infections, but this does not appear to give prolonged help to the asthmatic. Over a period of several years some cases are improved, others made worse. Inverting the body, to drain the bronchiectatic cavities while coughing, should be performed several times daily.

While out in cold weather, covering the nose and mouth with many layers of a woollen wrap, slow walking, and a conscious effort at shallow breathing will help to avoid attacks. Administration of cod liver oil, or one of the vitamin D concentrates, increases the resistance to acute bronchitis which always excites asthma in the elderly who have an asthmatic tendency.

AUTOGENOUS VACCINES

The careful preparation of a bronchial vaccine is very important. The saprophytic organisms grow many times as rapidly as do the disease-producing ones, and, if fresh sputum be not used and sub-culture be not resorted to, the saprophytic will crowd out the pathogenic bacteria. An important principle is that the organisms from a drop of the vaccine should be of the same character as those in the sputum coughed up from the lungs. The groups of streptococci and pneumococci are most important from an etiological standpoint. While on culture these groups vary considerably among themselves, any practitioner can determine gross defects in a vaccine by comparing under the microscope a drop of it stained on a glass slide with a stained smear of the patient's fresh sputum. This examination requires only a microscope, methylene blue stain, glass slides, and less than ten minutes of time. If the sputum is to be sent to a laboratory at some distance, a smear on a slide should accompany it, as the bacteriologist can better determine the more important organism from the smear.

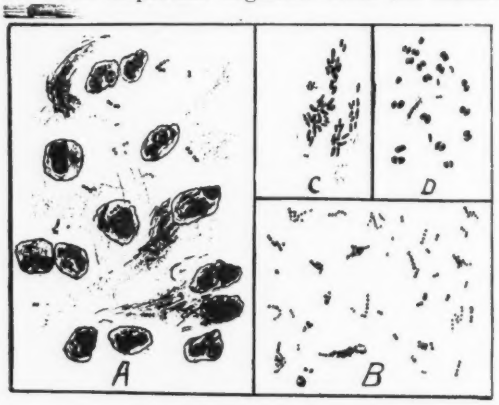

FIG. 3.—A, is a typical sputum from a patient with asthmatic bronchitis. B is a drop from a carefully prepared vaccine containing the same type of organism as the sputum. C and D are unsuitable vaccines, made from organisms in the throat which contaminate sputum and multiply rapidly.

The diphtheroids and *M. catarrhalis*, which grow even at room temperature, would make an unsatisfactory vaccine for a patient whose sputum contained the organisms shown in A of Fig. 3. A vaccine containing the organisms outlined in B of Fig. 3 would be satisfactory. When a patient has bronchiectasis many organisms develop in the dilated bronchi and complicate the problem of vaccine preparation, but those of the streptococcus group should be sought. The dosage should cause a moderate local reaction, but should not be large enough to aggravate the patient's symptoms. He should receive ten to fifteen injections at intervals of five to seven days. Such efforts to heal the bronchial infection give, at present, the best hope for relief of asthma in the elderly.

(I am indebted to the physicians of the Winnipeg General Hospital for cases, and to Dr. J. C. McMillan for the X-ray picture.)

BRUCELLA ABORTUS INFECTION IN MAN

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BRUCELLA ABORTUS infection was not proved in man until 1924, when Keefer[1] reported a case occurring in the United States. The close association of *Brucella melitensis*, the organism commonly causing undulant or Malta fever, and *Brucella Abortus*, which also causes Malta fever, was pointed out in 1918, by Evans.[2] Brucella melitensis is transmitted by goat's milk and is responsible for most of the undulant fever prevalent in Malta and many parts about the Mediterranean Sea. Brucella Abortus is a fairly common infection in our cattle and as high as 30 per cent of some dairy herds have been known to be infected. It is transmitted to human beings, supposedly by unpasteurized milk, and causes the disease known as undulant or Malta fever, sometimes spoken of as Brucella abortus infection. The two organisms, Br. abortus and Br. melitensis, are very closely allied, their chief differences being serological and the fact that the former is a prevalent infection among cattle, and the latter among goats. It seems to us that the disease will receive more widespread attention if the terminology is standardized and the designation "Brucella abortus infection" used to indicate it. Practically all the cases of so called undulant or Malta fever arising in this country will be due to Br. abortus. The varied nature of the symptomatology, often without an undulant fever, not corresponding to the prevalent idea of Malta fever, and not due to Br. melitensis, also seems to us to warrant the adoption of the name suggested.

No cases of Brucella abortus infection in man had been reported in Canada until June, 1928, when two cases by Jeffery[3] *et al*, from Toronto, and three cases by Harris[4] *et al*, from Ottawa, were reported in the *Public Health Journal*.

Occasional cases of Brucella abortus infection have been reported in the United Stated by Carpenter,[5] Belyea,[6] Huddleson[7] and others. There has been some speculation that an organism, relatively common in our cattle and known to be pathogenic to man, should not be the cause of more disease in man. Sensenich and Giordano[8] report seven cases of Brucella abortus infection in the United States. An excellent account of the symptomatology and various clinical types is given. Cases occur in three clinical types, *undulant*, *intermittent* and *ambulatory*, and the symptoms are so varied that the authors conclude many cases are undiagnosed in that country. The ambulatory and intermittent types being the more readily missed, clinically. Harris, in the *Public Health Journal*, states that many more cases will be reported in Canada, and urges the agglutination test as a routine with Brucella abortus of all blood which gives a negative Widal determination.

The clinical diagnosis of the disease may be made, or strongly suspected, if the undulant type of fever is present. In the cases here re-

ported, the typical Pel-Ebstein type of temperature was the feature that made us strongly suspect the disease. However, in the ambulatory and intermittent types, the Pel-Ebstein type of temperature is not present; there may be only slight fever, or it may be intermittent with varied clinical findings, such as arthritis, neuritis and phlebitis. The diagnosis must, of course, finally rest with either a positive blood culture of the Brucella abortus or positive agglutination tests with that organism. Agglutination at high dilutions has been insisted on by many observers in America. However, Sensenich and Giordano believe agglutination in a dilution of 1-50 to be diagnostic.

The cases here reported are of interest because they are among the first fully reported, which have occurred in Canada. Also, one patient (Case 1) had an illness lasting ten months, and was in various hospitals in Canada, and under treatment for various diseases before the true nature of his disease was discovered. Another reason for reporting these cases, with a brief outline of Brucella abortus infection in man, is that we believe the infection in Canada to be more common than is suspected. If attention is drawn to the possibilities of the disease, and laboratory facilities are available for the agglutination of the blood, many more cases will be diagnosed.

CASE 1

A man (B. R.), aged 22 years, born in Italy, had been in Canada for one year. He was first seen by one of us (I. S) on April 22, 1928, when he stated that he had been sick for eight months. There was nothing in his history prior to September, 1927, which appeared relevant. He had had no illnesses while in Italy, and was well for a period of months after coming to Canada.

It was rather difficult to obtain an accurate history but the patient said he had been sick for eight months with a fever, and profuse perspiration, loss of strength, cough with sputum, and slight, vague aches in his joints. During these eight months, from September until April, he had consulted many physicians and had been in one hospital for two months, with a diagnosis of typhoid fever, with four relapses. He had occasional rigors during the eight months. The things which bothered him most were the periods of high temperature associated with very profuse perspiration, some loss of appetite and the pains in his joints. However, he did not consider himself very ill and had been up and around for the greater part of his illness. It was impossible to obtain any further history except that a physician would visit him when he was feeling sick and find a temperature of 104 degrees; upon his return next day he would be surprised to find a normal temperature.

Physical Examination.—On April 22, 1928, the patient first presented himself for examination. He was thin, with flushed face and did not appear to be very ill. Temperature 103°; pulse 80. There was diminished resonance at the left apex with increased bronchophony and broncho-vesicular breathing. No râles were heard. The liver was not enlarged; the spleen appeared to reach one finger's breadth below the costal margin and was not tender. The examination was otherwise entirely negative. There were no glandular enlargements, no petechiæ nor rose spots; no apparent disease of the joints or peripheral nerves.

Laboratory Examination.—Urine normal. No pus present. Sputum was negative for tubercle bacilli. Blood: white blood cells 6,000 per c.mm.; red blood cells 3,800,000 per c.mm.; hæmoglobin 80 per cent (Sahli). The smear showed a moderate secondary anæmia. Differential count: polymorphonuclears 40 per cent; lymphocytes 54 per cent; monocytes 6 per cent.

X-Ray Examination.—Fluoroscopic examination was made and showed the mediastinum to be clear. Stereoscopic plates were made of the chest, which showed a minimal parenchymatous tuberculous infiltration at the left apex, with thickening of the ascending bronchus on the right.

A tentative diagnosis of tuberculosis was made but the patient was sent to hospital for observation, as we were unable to ascribe an eight months' illness, with high fever, to such a small area of tuberculous involvement which moreover, showed no signs of activity.

Progress.—For the first week of his stay in the hospital the patient showed marked remissions in temperature, from 104 to 99 degrees in an hour. At the time of the drop in temperature, the patient experienced the most profound perspiration. He did not appear to be very ill and complained of nothing but the drenching sweats, slight loss of appetite and cough with sputum.

Physical examination during this week showed no change from the initial examination, except that there appeared a few medium moist râles throughout the lungs. Repeated urinalyses were negative, as also were repeated sputum examinations for tubercle bacilli. White blood counts, taken during this week at various temperature peaks, showed a constant leucopenia, about 6,000, with a relative lymphocytosis. The blood smears were searched for malaria parasites and the spirochætes of relapsing fever, but none were found. The Widal test, by the macroscopic method, showed no agglutination to typhoid or paratyphoid.

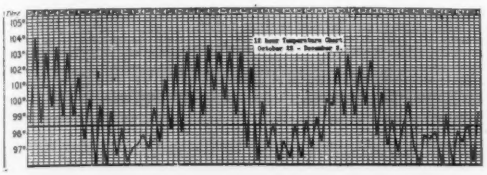
May 1st to 14th.—The patient remained much the same, except that the temperature did not go so high and there were no marked remissions. The temperature curve did not show any undulating character; however, he had a fever from 100 to 102 degrees every day. A mild phlebitis developed in the right leg, which cleared up in four or five days. Later, he developed a painful swollen elbow, which was not red. The pain and swelling disappeared in about three days.

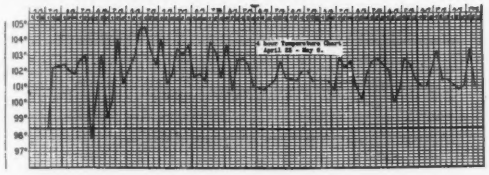
All attempts to find a cause for his temperature were unsuccessful. Intravenous neosol was given as a therapeutic test for relapsing fever. The arsenic failed to influence the course of the disease, so that we felt safe in ruling out relapsing fever as a possible cause of his illness. There were no signs of activity in the minimal tuberculosis present. A subcutaneous tuberculin injection gave a marked local but gave no systemic or focal reaction.

May 14th to June 1st.—About May 14th, we received, through the kindness of the hospital in which the patient had spent the months of November and December, 1927, his temperature chart and clinical record. The temperature chart was striking in that it showed a typical undulant or Pel-Ebstein type of temperature. During the eight weeks he was in that hospital, every alternate week he had a fever to 103-104 degrees, with daily remissions to 100. The weeks between these weeks of pyrexia, he was afebrile. The accompanying temperature charts show the curve at the two periods of his illness. He was discharged, in one of his afebrile weeks, as cured of typhoid fever with four relapses. No Widal test was done and he probably continued to have febrile and afebrile periods after discharge from hospital. The disease was clearly not

typhoid and our Widal test being negative, one was justified in ruling it out as the cause of his illness.

The Pel-Ebstein temperature curve could be produced by a granuloma (Hodgkin's disease), Brucella abortus infection, or, very improbably, tuberculosis. No evidence of the enlarged glands of Hodgkin's disease was found, and they, therefore, must be abdominal if present. The differential count, with no increase in





endothelial cells, was against Hodgkin's disease. Through the kindness of the Connaught Laboratories, University of Toronto, we were able to have agglutination tests done with Brucella abortus and Brucella melitensis. Positive agglutination with abortus 1-200 and with melitensis 1-80 were reported. A positive diagnosis of Brucella abortus infection was then made.

The patient's temperature reached normal about June 1st; his appetite improved and he was discharged from hospital. Stereoscopic plates of his chest were taken again, and the minimal tuberculosis was found unchanged as compared with the previous plates. The blood Wassermann test was negative. Blood examination on discharge was similar to that taken at time of admission, except for a slight increase in the anæmia. Blood: white blood cells 6,000; red blood cells 3,500,000; hæmoglobin 75 per cent (Sahli). Smear: polymorphonuclears 48 per cent; lymphocytes 43 per cent; monocytes 9 per cent.

Further agglutination tests done by the Connaught Laboratories gave an agglutination of 1-200 with Br. abortus. Blood sent to this laboratory for culture showed the presence of Br. abortus.

This case is a mild, undulant type of Brucella abortus infection in man, proved by positive blood culture and agglutination tests. The patient was at no time very ill, yet he was incapacitated for about ten months. The outstanding clinical points were that the patient looked so well when he had a high fever; the presence of drenching sweats; the Pel-Ebstein temperature curve; the marked remissions in temperature from 104 to 99 degrees in a few minutes; the presence of mild phlebitis and arthritis and the constant leucopenia, with a relative lymphocytosis. One can easily understand why such a case could remain undiagnosed, particularly, if the patient was not observed during the period when his temperature showed the Pel-Ebstein or undulant type of temperature curve.

The patient, though he came from Italy, had no illness while there, and there was a period of months after he arrived in Canada before this disease began. We, probably, are justified in saying that he became infected in Canada from unpasteurized milk. The actual source of his infection was not traced.

CASE 2

Mrs. F., aged 52 years: she came to this country from Italy, sixteen years ago. There was no history of any illnesses in Italy. Her past sicknesses included typhoid fever in 1923, which from details obtained was, probably, correctly diagnosed. No other members of her family were ill.

She was first seen June 1, 1928, complaining of feeling feverish, with headache and profuse perspiration. She had a slight cough with sputum. On questioning her regarding her illness, she was in good health, apparently, until January 1, 1928, when she had a severe chill with fever. She then volunteered the information that since January she had been sick every alternate week with a fever, headache, and general malaise; one week she would be so sick that she would have to stay in bed, the next week she would feel well and be able to do her housework. These alternating periods of ill health with fever and feeling of good health without fever lasted from five to seven days each and had persisted regularly since January. During her five months' illness, January to June, she had had slight, vague aches in her back and legs. No painful or swollen joints, and no phlebitis were noted. She had lost very little weight and did not consider herself very ill, except that she could not understand why she should be sick, so regularly, every alternate week.

Physical Examination.—The patient did not appear to be ill. The chest examination was negative, except that the heart was enlarged 10 cm. to left in the 5th interspace; no murmurs. The blood vessels were slightly sclerosed. Blood pressure, 50/90. In the abdomen nothing was abnormal; the spleen was not palpable; the liver, not enlarged. The joints, peripheral nerves, and glands were apparently normal. Temperature 104°; pulse 90. Blood: white blood cells 5,000; red blood cells 4,000,000; hæmoglobin 80 per cent. Differential count: polymorphonuclears 69 per cent; lymphocytes 23 per cent; monocytes 6 per cent. A catheter specimen of the urine contained a trace of albumen, an occasional pus cell, and granular casts.

A provisional diagnosis of Brucella abortus infection was made, and blood was sent to the Ontario Laboratory, Toronto, for agglutination. The blood showed positive agglutination in 1-320 with Br. abortus and in 1-160 with Br. melitensis.

Progress.—During the time the patient has been under observation, since June 1st, she has had one period of six days with continuous fever, with daily variations from 104 degrees to 100 degrees. This was followed by a week with no fever and no symptoms. The following six days she again ran a daily fever, to 103 degrees with remissions to 100 degrees. Since then, for two weeks, she has remained afebrile and without symptoms. A constant leucopenia was present, but without relative lymphocytosis.

This case has many points of difference from Case 1. The patient was never very ill, and during her afebrile periods she was symptomless. She greatly aided in the diagnosis by remarking

that every second week she was ill with a fever. Unfortunately, temperature charts were not available, as she was not ill enough to have nurses or to go to hospital, but from the history and the occasional temperature records obtained she, undoubtedly, would have shown a typical Pel-Ebstein temperature curve. The mild nature of the infection, probably, accounts for this case going undiagnosed for five months, although on only two or three occasions did she think it necessary to consult a physician. She stated that the only milk she had used for years was pasteurized milk from a local dairy. It was impossible to ascertain the source of her infection.

CONCLUSION

In June, 1925, five cases in human beings of Brucella abortus infection, occurring in Canada, were reported as preliminary reports. The cases cited here, the first to be reported in detail, make a total of seven. It is highly probable that many more have gone undiagnosed.

The Board of Health, by making it possible to have agglutination tests for Brucella abortus done on specimens of blood showing a negative Widal, can greatly help in the detection of more human beings suffering from this infection.

The varied symptomatology and the clinical course of the infection in man have undoubtedly, caused many cases to go undiagnosed. It is even possible that the organism in a primary focus may cause secondary lesions in the joints and nerves, without marked evidence of a generalized infection. This is suggested in the finding, by Carpenter, of Brucella abortus in seven out of fifty-five pairs of human tonsils, cultured after removal.

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AURICULAR FLUTTER RESTORED TO NORMAL RHYTHM BY QUINIDINE*

WITH THE REPORT OF A CASE

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THE interest in this report lies in the type of disturbance of cardiac mechanism and the method of its restoration to normal.

CASE REPORT

The patient, aged 38, was a private in the 22nd Regiment during the war. Since demobilization he has worked as a plasterer.

Personal History.—No definite history of rheumatism nor lues; prior to the present illness he had had repeated attacks of sore throat. About two and a half years ago he had to stop work on account of dyspnœa, oppression in the chest, and cough. After a fortnight's rest, at home, he was able to return to work, but was soon laid up again. Alternate periods of rest and work followed for two years and a half, until admission to hospital under Drs. C. A. Peters and D. G. Campbell, on December 22, 1927.

Complaints.—Breathlessness, precordial pain, cough and œdema of the legs of moderate degree.

Present Condition.—He also showed arrhythmia and a soft apical systolic murmur, with a few crepitations at the bases, but no gross heart failure. The Wassermann reaction was negative.

When at rest the ventricular rhythm was either regular, at about 75 per minute, or irregular, between 75 and 110. With exercise or excitement the rhythm became regular, at the rate of 150, but soon became irregular and slowed with rest. As the pulse slowed after this acceleration, the intervals seemed to bear a mathematical relation to one another. They lacked the gross irregularity frequently found in fibrillation of the auricles. A series of rapid

* From the service of Dr. A. H. Gordon, Montreal General Hospital.

regular beats would be followed by others, once and a half or twice as long, and this same phase of irregularity was frequently repeated. When the patient was at rest and the pulse slow, regular undulations could be detected in the jugulars, occurring about four times as fast as the ventricular rate.

The peculiarity of the irregularity, and these cervical undulations, were suggestive of auricular flutter, and an electrocardiogram definitely established the diagnosis.

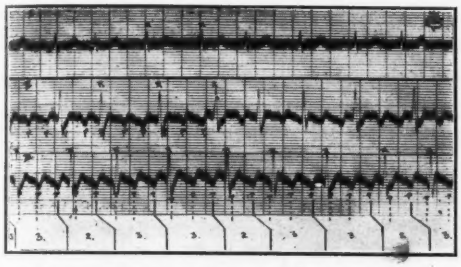

FIG. 1.—Electrocardiogram showing flutter of the auricles, on admission, December 22, 1927. Leads ii and iii show rapid waves marked "P" representing the "circus movement" of the auricle at the rate of 288 per minute. Every second or third "P" wave gives rise to a ventricular deflection (R) as shown by the black lines below. The other "P" waves, marked with dotted lines, are "blocked" and do not reach the ventricle. Note the sequence of intervals 233233; such an arrangement is characteristic of flutter.

TREATMENT

He was kept in bed and tincture of digitalis was given for six weeks after admission; the result was slower and more efficient ventricular action, and a more comfortable patient, though flutter still remained, the auricular rate remaining about 300 per minute. During the latter weeks he was able to be up about the ward for a portion of the day. Four and one-half ounces of the tincture were given, in all.

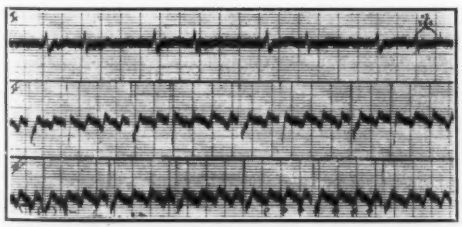

FIG. 2.—After five days' rest in bed on tr. digitalis m. 10, t.i.d. Patient much more comfortable, though the ventricular rate is unchanged. The auricles are beating more rapidly (320 per min.), the vagal being the predominant effect of the digitalis. Note the alternation of 2:1 and 4:1, response of ventricle to auricle in the leads i and ii. This sequence was heard at the heart and felt at the radial, and is characteristic of flutter of the auricles. The regular 4:1 response in lead iii is frequently seen when a flutter patient is at rest. The absence of "P" waves in lead i, (transverse) is due to the relation of the "circus movement" to this lead and is not uncommon in flutter.

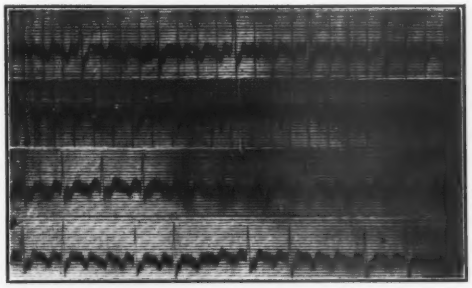

FIG. 3.—The upper line is taken at rest in bed after six weeks of tr. digitalis (4½ ounces). The ventricle is regular and more efficient and slowed to 75 per min. The auricular rate remains at 300 (4:1 response). The second and third lines show the effect of moderate exercise, with the abrupt doubling of the ventricular rate to 150 per min. but no change in the auricle (2.1 response). The effect of exercise soon ceases and the fourth line, taken within two minutes, shows the effect of rest, with a slower ventricle, alternating as in Fig. 2. Shortly afterward the rhythm returned to that seen in the upper line. This effort response is typical of flutter of the auricles.

Quinidine was started several weeks after entering hospital; a preliminary dose of two grains of the sulphate and then four grains every four hours. Almost immediately the auricular rate was slowed by one-sixth. The drug was well borne. The patient was kept in bed throughout this treatment. The drug was increased to six grains every four hours and when 226 gr. had been given the auricular rate was 180, which was probably slower than it had been in more than two and a half years. The ventricle, however, was beating at 90, which was not so slow as under digitalis. The dosage was increased to 8 gr. every 4 hours (32 gr. a day),

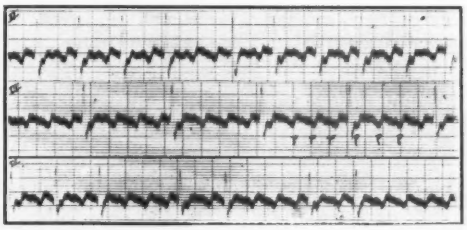

FIG. 4.—Quinidine sulphate therapy, February 14, 1928. Preliminary dose of 2 gr. and then three 4 gr. doses at 4 hour intervals. Tracing shows immediate slowing of auricular rate (P) to 252. In the middle line there is a regular 4:1 flutter, with the ventricle beating at 63, but irregularity is more usual with quinidine, as shown in the upper and lower lines.

XUM

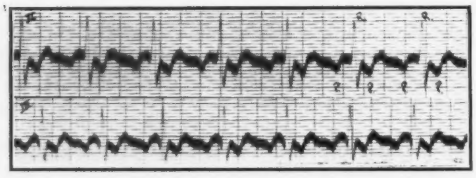

FIG. 5.—After 8 days of quinidine, gr. vi,q.4.h. (Total 225 gr.). Flutter 2:1. The auricle is slowed to 180 per min., the slowest of the series, the ventricle is now more rapid (90) than when under digitalis.

and this dosage was continued for five days up to a total of 500 gr. The patient had only a slight headache with little, if any, nausea, and a slight icteroid tint. The toxic effect of the drug became evident in the tracing (see Fig. 6) and drugs were stopped for a short period.

FIG. 6.—February 28, 1928. After 500 gr. of quinidine, gr. 8 q. 4.h., latterly. Auricular rate 200, ventricular rate 90. Aberrant ventricular beats (xx) indicate the toxic effect of the quinidine.

Combined digitalis and quinidine therapy in large doses, one dram, and 8 gr., respectively, every 4 hours, was tried, but soon stopped on account of nausea, and smaller doses of 10 minims and 4 gr. were borne for two days only, when headache, nausea and anorexia led to stoppage of this regime.

After a two-days' rest from all drugs, another course of quinidine was started on March 16th, with 4 gr., q.4.h., for a few doses and then 6 gr., q.4.h. Three days after starting this course normal rhythm was restored, with a total dosage of 750 gr. of quinidine (500 gr. in the first course; 100 gr., combined with digitalis in the second course; and 150 gr. in the last and successful course). The patient remained in bed in the ward for five weeks, with gradually decreasing dosage of quinidine, until 4 gr. thrice daily were given, and he is still receiving this amount.

Dr. A. H. Gordon made the following note on the patient's condition: "On the day following restoration to normal rhythm the external jugulars were much distended and pulsating with a systolic rhythm. Each vein was the size of a thumb. At the same time pulsation in the liver was demonstrated, but this was regarded as cardiac systolic ventricular pulsation, communicated. A systolic apical and substernal murmur was noted. Patient had no distress. This jugular pulsation gradually diminished and before discharge was scarcely recognizable."

On discharge the patient stated that he felt more comfortable than for several years. X-ray demonstrated cardiac enlargement to the right and left. The diagnosis was mitral endocarditis, auricular flutter, cardiac decompensation and tricuspid regurgitation.

He was advised to lead a sedentary life in the open air for six months at least, and to continue taking 4 gr. of quinidine three times a day during this period. Two months later he reported at the cardiac clinic at the Montreal General Hospital. There was no distress. He had followed the regime advised. The pulse was regular and the rate 72, and the tracing was normal.

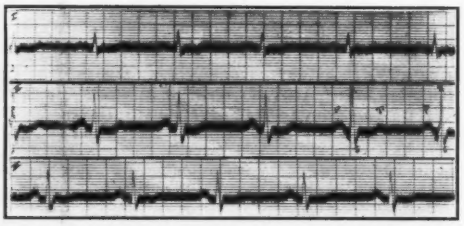

FIG. 7.—*Normal Rhythm*, March 19, 1928, after two courses of quinidine, of approximately 500 and 250 gr. (total 750 gr.). The patient was taking gr. 6, q. 4.h., when offset from flutter resulted in return to normal mechanism.

DISCUSSION

In auricular flutter[1] the normal cardiac mechanism is wholly in abeyance. Regular contraction waves travel clockwise, in a ring of auricular muscle around the venæ cavæ. The wave completes the same circuit over and over again in this ring, supplying the impulse to the remaining auricular tissue at each of these "circus movements." The conditions favourable to the establishing of circus movements are, (a) a large ring of muscle involved; (b) a slow rate of conduction; and (c) a short refractory period.

The ventricle beats at a slower rate, usually one-half, though, as a rule, in response to the auricle. Acceleration and heart-block are combined, therefore. Flutter may occur in short paroxysms but is more frequently persistent, lasting for months or years when untreated. It is closely related to fibrillation[2] of the auricles

and often becomes changed into it. Experimentally, flutter may be produced,[3] at times, by repeated stimulation of the auricle by rapid and rhythmic shocks. Clinically, it may be associated with rheumatic heart disease, influenza or other infections, lues and infections of the urinary tract, arteriosclerosis, coronary sclerosis and hyperthyroidism. Though seen for the most part in elderly subjects, it is also met with in quite young children and in adults of all ages.

A regular tachycardia with a fixed rate between 120 and 160 per minute, which persists for over a fortnight, is almost certainly flutter. Where flutter is continuous, the symptoms vary according to the ventricular rate and the state of the heart muscle. In many patients there is little disturbance; in these the ventricular action is slow and the muscle relatively strong. In others, when the ventricle is rapid there is dilatation of the heart, cyanosis, venous engorgement, enlargement of the liver and dropsy. The importance of flutter, clinically, lies in the rate engendered in the ventricle.

The influence on life is indefinite, though its persistence for eight years has been recorded, with the ventricle beating continuously at 150. The first case studied by Lewis "fluttered" from 1914 to 1926.[4] Severe congestive failure was relieved by digitalis in the first month of treatment, but drug treatment was refused after this time, and the patient was able to be about and had no further gross congestive failure. Speaking generally, the most important guide to prognosis before treatment is the degree of tolerance shown to flutter, *i.e.*, whether or not it rapidly induces congestion or heart failure. Response to treatment itself greatly influences prognosis. A useful existence is seldom possible, unless a normal rhythm is restored and maintained. Flutter, persisting in spite of treatment, induces great incapacity and high mortality.

Digitalis alone restores flutter to normal rhythm in one-third of the cases, and in another third it induces fibrillation. Withdrawal of the drug may then give a normal rhythm. Flutter may return and require a further course of digitalis. Digitalis slows and strengthens the ventricle, and may be pushed until the ventricular rate reaches sixty or even fifty.

Quinidine acts by lengthening the refractory period. It also slows conduction. The normal rhythm can be restored in flutter only by closure of the gap between the crest and wake of the oncoming wave. Success probably occurs only when the effect on the refractory period predominates. Quinidine converts established flutter to normal rhythm in 20 per cent of cases. Where digitalis has left the auricles fibrillating, quinidine may convert them to normal. An undesirable rapidity of the ventricular rate is an occasional accompaniment of quinidine therapy. Quinidine is contra-indicated with a history of hæmoptysis, venous engorgement, or with much enlargement of the heart.

It is stated that intramural thrombi may be formed during long paroxysms of flutter, and then expelled on the return to normal auricular activity under quinidine. In our case the period of flutter had exceeded two years and quinidine caused none of these untoward results. It would seem wise, however, to recognize this danger by confining to bed any patient under active "cinchonization."

SUMMARY AND CONCLUSION

1. In a young subject under forty years of age with established flutter and a heart definitely enlarged, but without gross cardiac failure, there was a marked tolerance to quinidine, and massive dosage (750 gr.) restored the normal mechanism of the heart beat.

2. Digitalis improved the ventricular action, but apparently deserves little, if any, credit for the offset of flutter.

3. Combined digitalis and quinidine therapy was poorly borne.

4. In a person under forty, with a heart relatively healthy, normal rhythm is so desirable that quinidine should be tried first, but in other cases foxglove should have first choice.

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INJECTION OF AIR BY THE LUMBAR ROUTE IN DIAGNOSIS AND TREATMENT*

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Montreal

WE recognize in roentgenology a valuable aid in the diagnosis of certain neurological conditions. By this means we can detect changes in the sella turcica due to intra- or supra-sellar pressure, changes in the suture markings due to increased intracranial tension, and injury or disease of the bones of the skull and vertebral column. Our difficulty has been, however, that the structures within this osseous cavity are of such uniform density or opacity that their various parts cannot be differentiated and lesions cannot be demonstrated. Rarely does a brain tumour become manifest on x-ray examination and, when it does, it is because of calcified areas which it contains, or because of its encroachment upon and involvement of the bony structures, or its obliteration of the air spaces in the nasal accessory sinuses.

Within the past decade attempts have been made to overcome this difficulty by injecting into the spinal fluid circulation, or by substituting for the spinal fluid, substances which will cast a shadow different from that of the intracranial and intra-vertebral contents themselves, and consequently will show distortions or other abnormalities of the spaces normally occupied by spinal fluid. We will dismiss with a word the first of these methods. In 1921 LaFay originated the iodine-containing vegetable compound lipiodol. In the same year Sicard and Forestier, finding that this was opaque to the roentgen rays and non-irritating, injected it into the lumbar sub-arachnoid space and by this means demonstrated a spinal cord compression. Since that time it has been widely used, and cases have been shown here in Montreal, by Russel and others, of cord tumours localized by this means. The lipiodol is injected into the cisterna magna and pictures taken with the patient in the upright position, or into the lumbar space, in which case the patient is turned upside down.

* Presented to the Neuro-Psychiatric Society of Montreal, April 4, 1928.

HISTORY

It was Dandy who first tried replacing the spinal fluid, and the medium which he used was air. In studying some cases of hydrocephalus in infants he found that by puncturing the ventricles, withdrawing the spinal fluid, and injecting air, he could get very good and extremely valuable pictures of the ventricular system. Often, by this means, he was able to determine the point of obstruction in patients with obstructive hydrocephalus. Desiring similar outlines of the basilar and pontine cisterns, he next tried injecting the air by the lumbar route. He came to the conclusion that of the two methods the latter was the more dangerous, and so it was given up for several years on this continent. He called the first of these operations "ventriculography" and the second "encephalography." In Europe however the procedure was carried on with greater enthusiasm, notably by Bingel and Wideroe. Several authors reported upon it and many cases were described without a fatality. In 1922, Schoot and Eitel drew attention to some of the ill effects which might follow encephalography. They noticed nausea and vomiting, pallor, sweating, shock, and sometimes fever, and an intense desire to defæcate. Since then the literature has been accumulating, both in Europe and, more recently, in America.

While encephalography was for some time in disrepute in the new world, ventriculography at once took its place in the diagnostic methods of the neurological surgeon. Grant, in an excellent critical review in 1925, discussed the two methods and analyzed the results in 392 collected cases of ventriculography. He concluded that the condition in which air injection is most desired is brain tumour, especially if localization is difficult by other means. But it is just in these cases, cases with increased intracranial pressure, that encephalography is dangerous and contra-indicated. He admits the

possibility of getting good photographic results in other conditions, but these are not amenable to treatment. His analysis yielded interesting data in regard to ventriculography. In his series positive information as to the position of the tumour was obtained in roughly 80 per cent of the cases. In 30 per cent of these all other evidence as to the location of the neoplasm was lacking. Of the 93 cases thus localized by ventriculography, in the absence of neurological evidence, 44, or nearly 50 per cent, of the growths could be removed by surgery. Less than 1 per cent of the operations were performed uselessly owing to misinterpretations of the air shadows. The mortality rate is high, more than 8 per cent, but less of course than that of unextirpated brain tumours.

In the last few years greater enthusiasm has been exhibited in encephalography on this continent. Martin and Uhler reported a series of 14 cases without a fatality. Carpenter has published a report of 40 cases. Waggoner presented a series of 10 before the Philadelphia Neurological Society, and Friedman and Kasanin reported 45 cases at the 1927 annual meeting of the American Neurological Society. Their series included a child of six months. At this meeting comment was in favour of the procedure. All are agreed that, when properly carried out on selected cases, it is practically devoid of serious results.

TECHNIQUE

Several methods of removing the spinal fluid and injecting air have been described. I have used that outlined by Waggoner. Carpenter advises that the interchange be carried out with the patient under ether-anæsthesia, but most workers use nothing apart from the local anæsthetic injected before the lumbar puncture needle is inserted. Before leaving the ward for the x-ray room the patient is given morphine gr. 1/4 and atropine gr. 1/150 or less, according to age and weight. When he reaches the x-ray room he is prepared, and an ordinary lumbar puncture is done, in the sitting position. The needle is inserted in the third lumbar interspace. The head of the patient should not be flexed too much, as this prevents the proper diffusion of the air. It is well to have the nurse stand in front of and close to the patient in case he needs support, perhaps for mutual support, for although I have seen the nurse faint dead away I have never known a like fate to overtake the patient.

When the meninges have been penetrated, the spinal fluid pressure is taken and then the interchange begins. To the shoulder of the lumbar puncture needle a three-way stop-cock is fixed the side outlet of which leads to a closed glass cylinder of about 200 c.c. or more capacity. To the horizontal outlet an ordinary Luer syringe it attached. Into the syringe are slowly drawn 5-10 c.c. of spinal fluid; the stop-cock is turned and the fluid is discharged into the cylinder. Immediately 5-10 c.c. of air are drawn into the syringe from the cylinder, the stop-cock is again turned and the air injected into the sub-arachnoid space. The remainder of the procedure is just a repetition of these acts. It is important to take the pressure of the spinal fluid frequently, at least after the withdrawal of every 25 c.c. and, as one approaches the end, more often. Opinion varies as to the relative amounts of fluid to be withdrawn and air injected, but is unanimous that the pressure should be the criterion. If possible, this should be kept constant. I have found that it tends to fall, and that one invariably ends up with a pressure considerably less than the original. For this reason I agree with Carpenter that about 10 per cent more air can be injected than fluid withdrawn, though most writers feel that the ratio should be reversed. In this regard it has been pointed out that the air is taken at room temperature and injected into surroundings of body temperature with a consequent expansion. In the ordinary adult about 100 c.c. or 120 c.c. are introduced.

The procedure is tedious, alike to patient and physician, and usually take about forty-five minutes to complete. In the case in which I encountered least difficulty the entire process lasted about twenty minutes. I have found that the fluid is usually difficult to get after 40 c.c. or so have been withdrawn, and then must be taken off in small quantities at a time. During the operation the patient almost invariably complains of headache at the base of the occiput, and this may become severe. In addition, the reactions which Schoot and Eitel described may be encountered, though I have seen only pallor, headache, sweating and

nausea. It may be necessary during the interchange to give the patient whiskey or aromatic spirits of ammonia to overcome his sense of insecurity.

It is well to have the subject, during all of this, seated on a stretcher with wheels, so that he may be immediately brought to the x-ray machine with a minimum of disturbance and movement. It is important that, while the pictures are being taken, the patient's head should be kept absolutely in a perpendicular plane, otherwise unequal diffusion of the air will take place and distortion of the ventricular shadows result. Lateral views are taken from each side, and an antero-posterior exposure with the film at the occiput, the head very slightly flexed, and the tube directed about the hair line, so as to avoid superimposing the shadow of the frontal sinuses on that of the ventricles. The patient is then returned to the ward, made to lie flat in a bed, the foot of which is raised, and given another hypodermic injection of morphine, if this is necessary. Weigeldt has stated that in cases without obstruction to the aqueduct of Sylvius or the foramina of Luschka and Magendie air in the ventricles is absorbed in eight to ten hours and, following encephalography, unpleasant sequelæ rarely last longer than that.

INDICATIONS

There are two contra-indications to this method of air injection; (1) increased intracranial pressure, and (2), posterior fossa tumours. In these cases, however, some surgeons perform a combined puncture. The ventricle is tapped, fluid is released to overcome the increase in tension, and air is injected into the subarachnoid space in the lumbar region. The only encephalography to end in death which I have seen was such a combined puncture, done on a patient with no clinical evidence of increased intracranial pressure, but with a massive infiltrating tumour of the right parietal lobe. A lumbar puncture was done about five hours after the combined puncture and air injection. At this time spinal fluid gushed out, only a little was removed but apparently the medulla and cerebellum acted as a sufficiently tight plug to prevent fluid escaping from above, and, when the man died about ten hours later, a hernia through the foramen magnum was found. Such a case would have offered a bad prognosis even for ventriculography alone, and still worse, of course if no intervention had been attempted.

This procedure has been followed and recommended in many conditions. Carpenter writes of its use in cases where diagnosis is otherwise doubtful, in petit mal, convulsions, chronic headache, occasional cases of mental impairment, certain head injuries, etc. In 40 cases in which he did encephalography, 19 presented normal findings, 21 abnormal pictures, and 1 died. In 23 trephine cases he had 4 normal, 19 abnormal and 3 died. Foerster, in addition, has applied lumbar air injection, suboccipital puncture, or ventriculography, in such conditions as hydrocephalus, infantile palsy, tumour, pseudo-tumour, encephalitis, etc. Wartenburg adds post-traumatic neurological and psychiatric disorders, dementia paralytica, and suggests its use in differentiating organic from functional hemiplegia. As you can readily appreciate the procedure has been employed in practically all available neurological conditions. Let us turn now to the results obtained.

INTERPRETATION

The interpretation of the results obtained by encephalography demand the attention of an expert radiologist used to this kind of work. One looks for variations in the size, shape and position of the ventricles, and for abnormal collections of air, either too little or too much, in the cisterns and in the subarachnoid space surrounding the cortex. Numerous reports have been made of the shadows encountered. Elsberg and Silbert, after having made casts of the ventricles in cases of brain tumour, and having compared them with the ventricular shadows obtained beforehand, drew the following conclusions. In posterior fossa lesions the ventricle contralateral to the growth is regularly more dilated than that of the same side. On the side of the tumour the posterior horn is consistently shorter, and is displaced forward and outward as compared with the other. This displacement of the homolateral posterior horn may account for the unilateral papill-œdema in some cases of tumour. In infiltrating tumours of the cerebral hemispheres the lobe in which the growth is located is often larger than the other. The vertical planes of the anterior

and inferior horns, in cases with hyperplasia of the hemisphere, are either collapsed or separated more than normal on the side of the tumour, while on the opposite side they are more closely approximated to each other. When there is no hyperplasia the relation of the horns to one another remains unaltered.

Hyperplasia is rarely present in dural tumours and rarely absent in infiltrating growths, therefore, separation of the vertical planes may be of diagnostic value. In comparing supra-tentorial and infra-tentorial lesions, the authors found that hydrocephalus occurring with the latter caused relatively little dilatation of the temporal horns, as compared with the anterior horns and bodies of the ventricles. In supra-tentorial lesions dilatation of the inferior horns was as great or greater than that of the others. They were not prepared to say how universal is this finding.

Turning to conditions other than neoplastic, we find Foerster describing dilatation of the ventricle on the side of vascular lesions, dilatation of the ventricle on the side of focal lesions in epilepsy with convulsions beginning in a particular part, and widening of the subarachnoid spaces with dilatation of the ventricles in pseudo-tumour, often owing to infectious or traumatic meningitis. In epidemic encephalitis he also found dilatation of the ventricles. He points out the value of encephalography in differentiating obstructive and communicating types of hydrocephalus, as in the former little or no air will get into the ventricles, and the point of obstruction may be seen. Wartenburg found that following trauma to the skull, even without fracture, there is often widening of the ventricle on the side of the lesion with a rounding off of the upper angle of the "butterfly figure" which is normally assumed by the shadow of the bodies and anterior horns of the lateral ventricles. This angle shows a tendency to wander towards the site of the lesion; when the projection of the angle is towards the superior portion of the brain the signs point more to involvement of that part, when it bends on itself and extends towards the ear the signs point to an involvement of an inferior level of the cortex. In cerebral infantile palsy he states that there is constant widening of the ventricle on the affected side together with large subarachnoid spaces. Encephalography may be used also in attempts to localize tumours causing pressure on the spinal cord, in some of which cases the arrest of air within the intravertebral canal will indicate the point of compression.

It is important to bear in mind that in some of these conditions such marked and definite post-mortem changes are not found, and it would be unwise to lay too great stress on the nature of the changes observed after air injections, until the variations that may occur in the normal are known. It is true that different conditions prevail at these different times, and that encephalography allows a study of what Foerster describes as the "anatomy in vivo." Monrad Krohn, whom I quote from memory, in discussing the paper of Friedman and Kasanin, said that after having carried out this procedure he had come to the conclusion that one could not depend on an equal and uniform diffusion of the air throughout the ventricular and subarachnoid systems, but that after hearing the paper and the discussion it provoked he was inclined to try encephalography again.

TREATMENT

The use of lumbar air injection in treatment is more recent than that in diagnosis, to which the foregoing discussion has been confined, and I have had no personal experience with it. As a result, it will be referred to only briefly. The condition in which it has been used most, and for which best results have been claimed, is post-traumatic headache. It has also been employed in epilepsy, the sequelæ of encephalitis, and other post-traumatic conditions. The technique is the same as that here described, and a similar amount of air is injected. Wartenburg reports subjective improvement in a surprising number of cases, and Carpenter reports three cases of severe chronic headache cured by this means. He says that several other disturbances improved after encephalography without other treatment, and offers as explanation either distension of the membranes or reaction from the presence of the air. Penfield has treated seven cases of post-traumatic headache by means of lumbar air injection. At a recent meeting of the Montreal Medico-Chirurgical Society Malcolm showed two cases

in which he had obtained gratifying results.

I wish to present briefly three cases in which encephalography has been employed as a diagnostic measure.

CASE 1

The patient, a man of 56 years, had in January, 1925, a febrile illness in which he shook or shivered all over. The left arm and leg shook more than the right. For two weeks after the onset he had weakness of the left side of his body, and did not have sufficient strength to hold things in his hand. He had frontal headache at times. In April, 1925, he developed a cramped, painful feeling in the left arm, left leg, and left side of the face, which was followed immediately by unconsciousness lasting fifteen minutes. During the attack both arms and both legs underwent jerking movements. He had eight such attacks from April, 1925, to May, 1926, and fewer since. He was admitted to hospital on December 12, 1927. The history in this case was very indefinite, the real duration of the attacks could not be accurately determined, and the nature of the initial febrile illness was obscure.

Examination showed a tendency for the tongue to protrude slightly to the right, a weakness (?) of the left side of the soft palate, and weakness of the left arm and leg. The tendon-jerks were increased on the left as compared with the right. Memory was impaired, so much so that he could not tell whether his illness had begun in 1925 or 1926. X-ray of the skull, examination of the fundi, and spinal-fluid Wassermann were all negative. The cerebrospinal fluid gave a one-plus Pandy reaction, and reduced colloidal gold (123200234). Dr. Bromer's report of the encephalogram is as follows: "Examination by encephalogram shows a complete lack of sub-arachnoid air in the right half of the skull. The left shows a normal amount of sub-arachnoid air. The right ventricle has an obviously deformed outline, somewhat flattened and thinned. The left is distorted and widened. I think that this is strong evidence of neoplasm, probably glioma, on the right side." The patient is still under observation in the outpatient clinic.

CASE 2

The patient, aged 31 years, was admitted to hospital on October 22, 1926, with the following history. In 1918, while bunting a football with his head, he suffered a fracture of the skull. For three months after this he had total paralysis of the left side, and for six months numbness on this side. He improved and returned to work. In May, 1926, he lost control of his left arm while working at his dyeing. The weakness in this member grew progressively worse. On extension of his arms, he showed a coarse, wavering movement of the entire left arm. The left side was weaker than the right, and this was most marked in the leg. The tendon-jerks on the left were increased as compared with the right. Examination of the eyes showed nystagmus, but nothing else abnormal. Lumbar puncture, shortly after admission, yielded a spinal fluid with 11 cells per c.mm., a two-plus Pandy reaction, a negative Wassermann and a reduction of colloidal gold in the paretic zone (5555533000). It was thought at first that he had a cyst resulting from his old accident.

The report of an x-ray of the skull, taken on October 22, 1926, is as follows: "Sella measures 4 mm. by 8 mm. in depth and is normal; convolution markings are normal; no other abnormalities can be seen." An encephalogram was done and it was at first believed to present evidence of a fronto-parietal tumour. Re-examination however dispelled this belief, and attributed the previous findings to the fact that the patient's head had been tilted. On November 16, 1926, Dr. Bromer made his final report which follows: "On final examination, the lateral ventricles on each side are more nearly of the same size and shape. The head was tilted downwards on the left side and in consequence on the films the antero-posterior view shows the left ventricle only slightly wider than the right, and with slightly more blunted horns. (See Fig. 1). The stereoscopic lateral

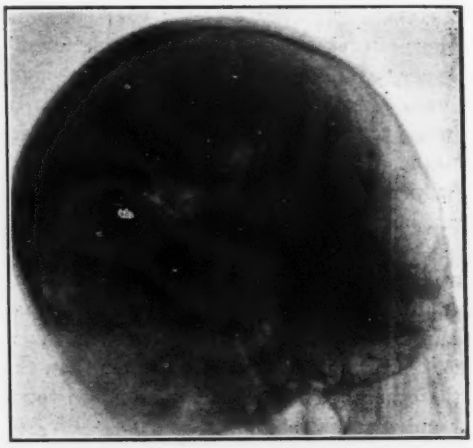

FIG. 1.—*Case 2.*—Encephalogram, antero-posterior view.

views show no great difference apparently in the ventricles. I think this second examination practically rules out the possibility of a tumour in the fronto-parietal region, as was suggested by the previous films. The sub-arachnoid spaces on the left are also more completely filled with air than on the right. The occipital area in the lateral view has also a little more air as compared with the frontal and parietal areas. I doubt however that this means brain atrophy." (See Fig. 2).

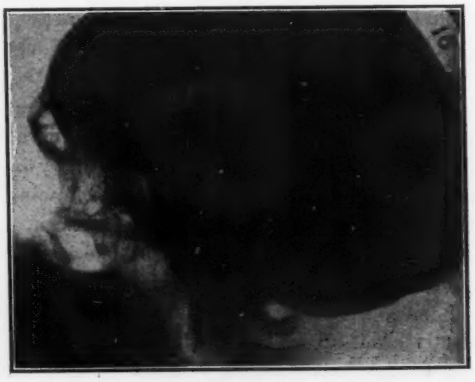

FIG. 2.—*Case 2.*—Encephalogram, lateral view.

During his stay in hospital the patient gradually developed into a most marked and typical case of multiple sclerosis, presenting numerous signs, including Charcot's triad of symptoms.

CASE 3

This patient, a seven-year old Italian girl, was admitted on September 21, 1926, with a diagnosis of epilepsy. Her development was normal until 1920, when she had a generalized convulsion followed by weakness of the left arm and leg lasting a day or two. Since then she had had several attacks a year. On examination, the right pupil was larger than the left, and both

were very irregular. There was a droop to the left side of the mouth, and the left side of the soft palate moved less than the right. A coarse, rapid, lateral nystagmus was present when the eyes were turned to either outer canthus, more marked when turned to the left. The fundi were negative.

Encephalography was done on October 27, 1926, with the following results: "The anterior horn of the right lateral ventricle is wider than normal, more distended than the left. The posterior portion of the right is much enlarged, and is circular in shape, extending upwards and backwards. The left ventricle is narrowed and distorted also in shape, resembling a compression distortion. The midline septum is not bulging or distorted, however. Very little sub-arachnoid air (see Fig. 3) can be seen on either side. These changes could be due to an internal hydrocephalus involving the right ventricle or to a porencephalon cyst. There is no apparent brain atrophy. The third ventricle is obliterated but the fourth can be seen, however." (See Fig. 4).

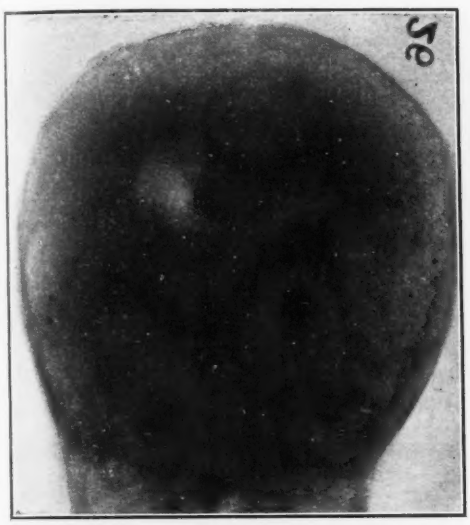

FIG. 3.—*Case 3.*—Encephalogram, from the front.

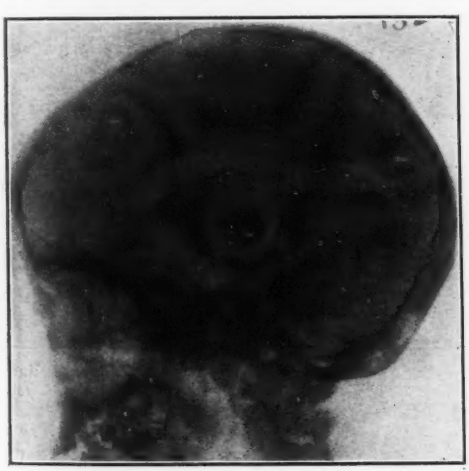

FIG. 4.—*Case 3.*—Encephalogram, left lateral view.

CONCLUSION

In encephalography we have a useful method of examination and of treatment, the full value of which is not yet demonstrated, but I cannot brush aside the criticisms of Grant with which, in large measure, I agree.

I desire to thank the Philadelphia Orthopædic Hospital and Infirmary for Nervous Diseases for permission to present this clinical material; Drs. Burr, Sinkler and Weisenburg, from whose services the cases were taken; Dr. Ralph S. Bromer, the radiologist there; and especially Dr. Joseph Michaels, resident neurologist, who kindly collected the plates, abstracted the records, and forwarded all to me.

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Plato in his "Republic," Book III, turns prophet, and draws a splendid picture of the day "when our youth will dwell in a land of health, amid fair sights and sounds, and receive the good in everything; and beauty, the effluence of fair works, shall flow into the eye and ear like a health-giving breeze from a purer region, and insensibly draw the soul from the earliest years into likeness and sympathy with the beauty of reason." With all our boasted advance in science and civilization how far short of this ideal do we come to-day?

CARCINOMA IN A BLUE DOMED CYST OF THE BREAST*

BY L. J. ADAMS, M.D., C.M.,

Montreal

THE patient, a woman of 43, was admitted to the Montreal General Hospital on January 9, 1928.

She gave a history of acute inflammation of the right breast while nursing her first child one year previously, and of two blows to this breast at the ages of twenty-one and forty-one years respectively.

In November, 1926, she first noticed a small lump in the upper outer quadrant of the right breast. It was then about the size of a pea. There was no apparent change in size until March, 1927, when it began to grow gradually. In July, the surface became reddened, and subsequently the increase in size was more rapid. Early in December there was a fairly large amount of grayish discharge from the nipple, with diminution in the size of the tumour. There was no discharge of blood from the nipple at any time, and no loss of weight. Since July, 1927, there had been intermittent pain in the breast, radiating down the arm, but never very severe.

On admission, there was found in the upper outer part of the right breast, a large firm mass measuring 12 x 12 x 6 cm. The tumour was not tender and was freely moveable in the breast tissue. A superficial cyst, dark blue in colour, and about the size of a small egg protruded from the upper part of the mass. There was no deformity of the nipple. There were no palpable glands in the axilla.

A diagnosis of cystic mastitis, with possible malignancy, was made.

Simple amputation of the breast was performed on January 11, 1928. When the tumour was incised, a large quantity of clear light brownish fluid escaped, exposing a multilocular cyst with areas of induration in the wall and slightly papillomatous ingrowths.

The microscopical examination of sections of fixed tissue confirmed the diagnosis of carcinoma made at the time of operation by means of frozen sections.

The patient was readmitted on February 9, 1928, when a radical operation was carried out. No enlarged axillary lymph-nodes were encountered. Her recovery was uneventful.

SUMMARY OF PATHOLOGICAL REPORT

The specimen consists of a female breast, covered by an oval piece of skin, 22 x 18 cm. in size, with the subcutaneous tissue attached. The external surface is as already described. (Fig. 1.)

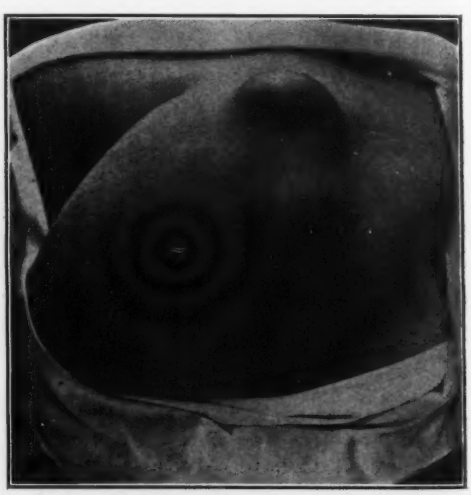

FIG. 1.—Photograph of a wax moulage of the external surface of the breast. Note the large cyst at superior margin.

The cut section (Fig. 2) shows a large cyst, measuring 9 x 6 cm. by approximately 2 cm. in depth. It is sharply outlined and well demarcated from the surrounding breast tissue. The large cyst can be seen to communicate directly with the superficial one which is covered by skin only. The wall is very irregular, with an attempt to form smaller cysts. The lining surface is smooth, except for

* From the Department of Pathology, Montreal General Hospital. Read before the staff clinico-pathological conference, March 8th, 1928.

FIG. 2.—Drawing of the internal surface of the cyst.

several hard yellowish gray nodular masses which project into the cavity.

Microscopical sections were taken from the breast tissue outside the cyst, and from the smooth and puckered areas in the wall, to determine whether the condition was a large simple cyst with simple papillomatous growths in the wall, or one with malignancy.

Those from outside the cyst show fairly normal breast tissue for the age period; those from the smooth areas show a thin fibrous wall.

FIG. 3.—Microphotograph showing carcinoma. The section is taken from one of the hard papillomatous areas.

Those from the papillomatous areas (Fig. 3) show a fibrous connective-tissue stroma, with a round-celled infiltration and atypical epithelial cells with hyperchromatic nuclei, growing in irregular groups or strands without any definite structural arrangement. There is a great increase of fibrous tissue, as well as large degenerated tumour areas.

The second specimen, consisting of a portion of the skin of the breast, 28 cm. long, with the underlying pectoralis muscles and the soft tissues from the right axilla, was received on February 8th, at the time of the second operation. Serial transverse sections were made. After diligent search, microscopical examination failed to reveal any carcinomatous involvement of the glands or deeper structures.

DISCUSSION

This case was regarded as a large single cyst of the breast of the so-called "blue-domed" type. Grossly, it appeared as a typical benign cyst, but since maligancy has been demonstrated there are several interesting features to note.

There is a great variety of classifications of cysts of the breast. In general, it may be said that they vary greatly in size and number. The blue-domed cysts are usually of the large single variety, but they may be multiple. In Bloodgood's series of 350 cases of cystic diseases of the breast, 174 were large single, 28 were large multiple cysts. The blue dome may not be seen until the subcutaneous tissue is cut, the colour being due to the transmitted light from the contents. The wall is smooth and there are, as a rule, no papillomata. Hæmorrhage into the cyst suggests malignancy. As to the occurrence of carcinoma, the condition, especially in the large single cysts, is regarded as comparatively rare, about 2 per cent.

The etiology of carcinoma in our case, as elsewhere, is not definitely known, but it is interesting that two frequently mentioned factors, namely trauma and infection, were both present. Again, here is a case of cystic disease of the breast with malignancy, in which the nipple was neither scarred nor retracted, but retained a perfectly normal appearance, even though a discharge had taken place from it.

The case is unique in that the blue dome could be seen very readily, and was covered on the external surface by a thin layer of skin

only. Another feature is that, with carcinoma present, no blood could be detected in the cyst-contents.

Finally, this case emphasizes once more the importance of careful attention to the history of a lump in the breast. It also illustrates that in a large cyst, although situated some distance away from the nipple malignancy does occur.

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PATHS FROM THE PERIPHERY*

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"The world that I regard is my self; it is the microcosm of my own frame that I cast mine eye on; for the other, I use it but like my Globe, and turn it round sometimes for my recreation. . . .whilst I study to find how I am a microcosm, or little World, I find myself something more than the great."—SIR THOMAS BROWNE, *Religio Medici*.

THERE are many paths by which the fleeting impulse from the world outside reaches that connoisseur of impulses, the central nervous system. These are of the utmost importance, for, as Herrick[1] has so aptly recapitulated, "The living body is a little world set in the midst of a larger world. It leads in no sense an independent life, but its continued welfare is conditioned upon a nicely balanced adjustment between its own inner activities and those of surrounding nature, some of which are beneficial and some harmful." As lowly vertebrates we paid a good deal of attention to these stimuli from the ectoderm. They governed our very life, our habits, were instinctive, stereotyped. To the dignified mammal of the modern era they are of no less importance. The pre-eminence of man is directly due to his ability to cope most successfully with his environment.

When we think of the innervation of the comparatively vast skin surface of the human body there are two questions which should present themselves to our minds. In the first instance, what nerve supplies each area of skin and, in the second, from what segments of the cerebro-spinal axis do the nerve-fibres supplying this cutaneous area arise? These questions have found their answers in the construction of two diagrams to show the innervation, respectively, of the anterior (Fig. 1) and posterior (Fig. 2) surfaces of the human body. By correlating the work of Henry Head[2] and Purves Stewart,[3] it has been possible to illustrate by diagram upon the same figure the respective nerve and segmental innervation of any part, in a fairly accurate, but, for purposes of simplicity, a very diagrammatic fashion. As the essential importance of this knowledge makes its retention by the physician desirable we have sought a simple method for remembering its detail. A plan, originally suggested by Purves Stewart, in the main, has been adopted. The cutaneous nerve-supply is familiar to most of us because of our visual memory of these fibres during dissection of the body. Hence, apart from the confusion of old terminology with B.N.A. nomenclature, they may be simply recalled. The arrangement of the cutaneous root areas is considerably simplified if we consider the conception that in the trunk they exist mainly in a horizontal series; whereas in the upper limbs they are represented in longitudinal series, parallel to the long axis of the limb; and in the lower limbs anteriorly they exist serially from above downwards and posteriorly from below upwards. Finally, the genital organs receive their innervation, as might be expected, from segments caudal to the segments supplying the posterior surface of the lower limb buds, that is from the third and fourth sacral segments. If we consider the body as a long cylinder, beginning above at the head (innervated by the trigeminal nerve) and ending below at the coccyx, then the various root-areas may be represented as a series of horizontal dermatomes running from above downwards, with the nose and mouth in the trigeminal area; the nipples

* A lecture delivered to medical students at the University of Western Ontario.

at the level of the junction between the fourth and fifth thoracic segments; the umbilicus at the junction of the ninth and tenth thoracic; the last thoracic encircling the area just above the pubes; and the anus within the fourth sacral area. Such a plan of the cutaneous innervation of the trunk, as simple as that of the round worms, requires modification in only two particulars. In the first instance, it is necessary for us to remember that there is a gap in this segmental innervation between the clavicular region, innervated by the fourth cervical, and the upper pectoral region, supplied by third thoracic segments, where the fibres from the anterior rami of the fifth, sixth, seventh, eighth cervical and first two thoracic segments pass distally to supply the fore-limb bud. Secondly, it is necessary to recall that a similar gap occurs in the lumbo-sacral region between the twelfth thoracic segment, just above the pubes and the third and fourth sacral segments in the ano-coccygeal region, where the anterior rami of all the lumbar and the first two sacral segments pass distally through the lumbo-sacral plexus to supply the lower limb buds.

With this conception of the segmental innervation of the trunk in mind, we find the forepart of the scalp, from a point opposite the external auditory meatus forwards, innervated by branches of the ophthalmic division of the fifth cranial nerve, while the integument over the forehead, the superior maxillary and infra-orbital, and inferior maxillary regions of the face, are innervated by the ophthalmic nerve, the maxillary nerve and the mandibular nerve respectively. The back of the scalp behind the level of the external auditory meatus is supplied by the greater occipital from the posterior ramus of the second cervical root, towards the midline, while more laterally it receives its innervation from the lesser occipital from the second cervical segment. The auricular region is supplied by the greater auricular from the second and third cervical segments, its posterior portion also receiving some fibres from the lesser occipital nerve. The medial portion of the back of the neck is supplied by the medial divisions of the posterior rami of the cervical nerves, while the sides and front of the neck are supplied by the cutaneous colli nerve from the second and third cervical segments. The supraclavicular, infra-clavicular, acromial, upper pectoral regions, and the skin over the supraspinous fossa of the scapula are supplied by the supraclavicular nerves from the anterior rami of the third and fourth segments of the cervical cord. The skin surface between the upper pectoral region and the level of the nipple is supplied on its anterior

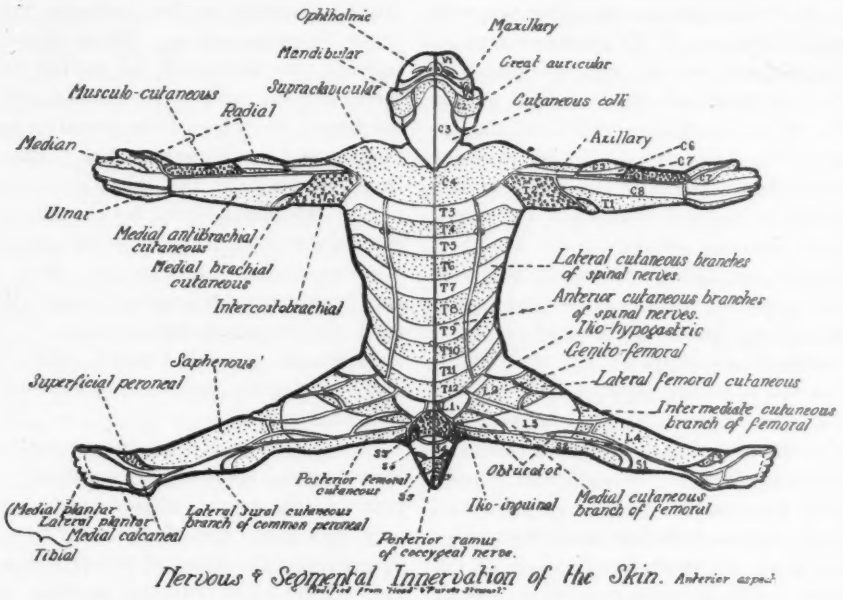
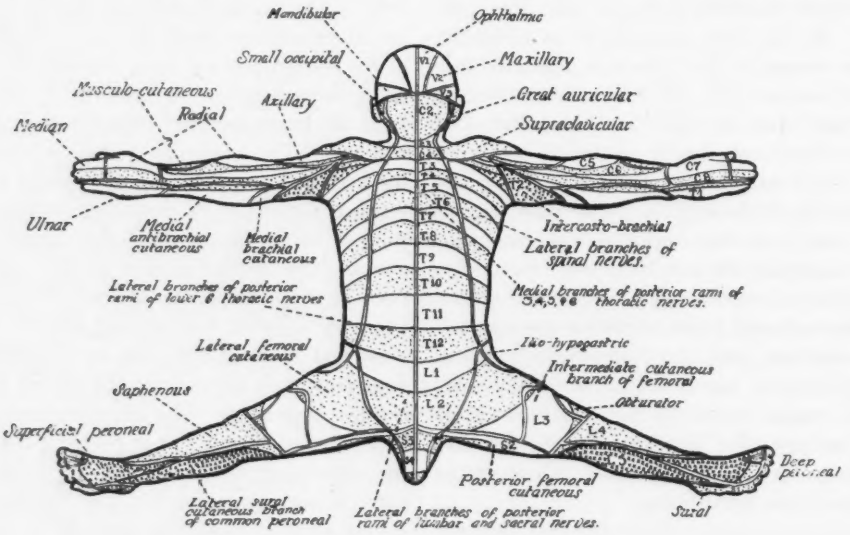


FIG. 1

and lateral aspects by the anterior and lateral branches of the third and fourth intercostal nerves, from the third and fourth thoracic segments. The posterior portion of the corresponding area receives its innervation chiefly from the same segments through the posterior rami of the third and fourth thoracic nerves, but in addition receives a few fibres from the muscular branches of the medial divisions of the posterior rami of the fifth and sixth cervical and the first and second thoracic segments (not shown in the diagram). There occurs an oddity of the innervation of the skin surface of the posterior aspect of the trunk, which at this point is well worth noting, in the fact that while the upper part of the posterior aspect of the trunk is supplied by the medial branches of the posterior rami of the spinal nerves, the lower part of the corresponding area below the level of the sixth thoracic segment is supplied by the lateral branches of the posterior rami of these nerves. The skin surface of the body wall between the level of the nipple and that of the umbilicus is about equally divided in its segmental supply between the fifth, sixth, seventh, eighth and ninth thoracic segments, which send their fibres to the back from the posterior divisions of the spinal nerves and to the sides and front through the anterior divisions (intercostal nerves) . Between the level of the umbilicus and the symphysis pubis the abdominal wall is supplied on its anterior and lateral aspects by the anterior and lateral branches of the tenth, eleventh and twelfth thoracic nerves, from the corresponding segments of the thoracic cord. The lumbar region receives a corresponding innervation from the same segments through the lateral branches of the posterior rami of the lower thoracic nerves. Below this level, posteriorly, the skin over the medial gluteal and sacral regions receives its nerve supply through the lateral branches of the posterior rami of the lumbar and sacral nerves, the perineal regions being supplied by the third and fourth sacral nerves, the sacral region by the fifth sacral and coccygeal nerve. Anteriorly, the genitals receive a corresponding nerve supply from the third and fourth sacral segments through the anterior rami of the sacral nerves where fibres at this level arising from the second, third and fourth segments enter into the formation of the pudendal nerve.

If we remember that the upper extremities have grown horizontally outwards from the trunk in the cervico-thoracic region, then it is only reasonable that they should be innervated by segments the fibres of which follow the long axis of the arms, running parallel with those which above and below course band-like about the trunk. Thus, when the arms are held out-



Nervous & Segmental Innervation of the Skin. Posterior aspect.
Modified from Head & Purser Structure

FIG. 2

stretched at right angles to the long axis of the body, with the thumbs uppermost, the segmental areas are approximately from above downwards C5, C6, C7, C8, T1, and this is true of both the anterior and posterior surfaces of the arm. Since there is so much overlapping in these areas of innervation, we should not be seriously wrong if we divided the arm held horizontally from above downwards, that is from its radial to its ulnar side, into almost equal portions for each of the roots of the brachial plexus of nerves. To this working rule for the segmental sensory innervation of the upper extremity there are two important exceptions. In the first place all the segments sending fibres to the brachial plexus are not represented in the hand, which is divided about equally between the seventh and eighth cervical and first thoracic segments. The seventh cervical segment supplies the thumb and index fingers, front and back; the eighth, the middle, ring, and the contiguous half of the little finger on the front, and only the middle and ring fingers on the back of the hand; while the ulnar side of the little finger on the front and the entire little finger on the back of the hand are supplied by the first thoracic segment. Secondly, it should be pointed out that the inner side of the superior half of the upper arm is supplied by the second thoracic segment through the intercosto-brachial nerve. With these points in mind we are now in a position to consider the sensory nerve supply of the skin of the upper extremity more accurately.

The upper portion of the shoulder cap is supplied by the fourth cervical segment, through the supra-acromial branches of the supra-clavicular nerves. The third cervical segment ordinarily contributing to this nerve is not represented thus far distally. Just distal to this area the remaining portion of the deltoid region is supplied by the fifth and sixth cervical segments through the axillary nerve. The inner side of the upper arm, front and back, from the floor of the axilla to about two inches above the elbow is supplied by the intercosto-brachial nerve from the second thoracic segment. A small area on the inner side of the arm just below the latter, and extending as far as the elbow, is supplied by the medial brachial cutaneous nerve which although it arises from the medial cord of the brachial plexus receives all of its fibres from the second thoracic segment. A large area reaching from the elbow to the wrist on the ulnar side of the arm, extending over half way across its anterior or volar surface, and about one third of the distance across its posterior or dorsal surface, is supplied by the medial antibrachial cutaneous nerve from the eighth cervical and first thoracic roots. The skin surface of the lateral or radial aspect of the volar surface of the forearm from about an inch below the head of the radius to the base of the thumb, in addition to a small area on the dorsal surface over the lower end of the radius, is supplied by the musculo-cutaneous nerve, the cutaneous fibres of which arise in the sixth cervical segment. The remaining surface on the back of the arm, that is a small area in the mid-line above the elbow, the lateral two-thirds of the dorsal surface of the forearm, together with a small area over the muscular portion of the brachio-radialis at the front of the elbow, is supplied by the radial nerve from the fifth, sixth, seventh and eighth cervical segments. The first thoracic segment usually sends no fibres to the radial nerve. On the front of the hand the little and half of the ring fingers, with their corresponding palmar surfaces, are supplied by the ulnar nerve from the eighth cervical and first thoracic segments; while the ulnar side of the thumb, index, middle and half of the ring fingers, together with the radial side of the palm, are supplied by the median nerve from the seventh and eighth thoracic segments. The firbres from the fifth and sixth cervical and first thoracic roots are not represented in the cutaneous distribution of this nerve. A small area at the base of the thumb, innervated by the musculo-cutaneous nerve, should be included in the sensory innervation of the skin of the hand. On the dorsum of the hand, as on the palmar surface, the little and half of the ring fingers are supplied by the ulnar nerve from the eighth cervical and first thoracic roots. The dorsal surfaces of the distal two phalanges of the thumb, index, middle, and contiguous half of the ring finger are supplied by the median nerve from the seventh and eighth cervical segments, while the rest of the dorsum of the hand, thumb, index, middle and radial half of the ring fingers as far as the proximal interphalangeal joints are supplied by the radial nerve from the seventh and eighth cervical roots. Fibres from the fifth and sixth cervical segments are not carried in this nerve as far as the hand.

In considering the lower extremity we must

think of a quite different plan of innervation from that which obtains in the upper one. If we regard the legs as horizontal outgrowths from the lumbo-sacral region, and visualize them for the moment as strongly rotated from within outwards so that the great toes are uppermost, then the cutaneous root areas are seen to take on a rather segmental arrangement, but in this region, in contrast to the upper limb, the segmentation is in a vertical rather than a horizontal axis, the root areas running from above downwards on the anterior surfaces, and from below upwards on the posterior surfaces of the legs in this position. Thus the various components of the lumbo-sacral plexus are distributed in a very reasonable fashion, in proper sequence from thigh to knee, to leg, to dorsum of foot, to sole of foot, to back of lower leg, to back of thigh. There is but one exception to this plan, which will be pointed out later. The first band-like area, somewhat variable, but measuring a depth of approximately two inches of the skin surface of the thigh, front and back, is supplied by the first lumbar segment. A wide area below this region, extending about half-way down the anterior, medial and lateral aspects of the thigh, is supplied by the second lumbar segment. The rest of the skin surface on the front and sides of the upper leg, as far distally as the level of the upper border of the supra-patellar bursa, is supplied by the third lumbar root. The fourth lumbar segment sends its fibres to the front and inner side of the leg from the suprapatellar region to the ankle, the fifth segment supplying the corresponding area on the outer side and front of the leg from the level of the head of the fibula to the dorsum of the foot. Thus, the area supplied by the fifth lumbar root is lateral to but on a somewhat lower level than the region supplied by the fourth lumbar segment, so that the apparent interruption of the segmental plan, which was referred to above as constituting the only exception, is more apparent than real. The skin over the dorsum of the toes, the sole of the foot, and the back of the lower leg in its lower two-thirds is supplied by the first sacral segment, while the second sacral root supplies the remaining portion of the back of the leg left bare by the lumbar segments, excepting a small area in association with the buttock supplied by the third sacral segment.

Now, keeping this plan of the segmental innervation of the skin surfaces of the lower extremity in mind, we are in a position to consider its more exact nerve supply. A small area of skin on the outside of the thigh, just below the iliac crest and merging on the anterior and posterior surfaces, is supplied by the ilio-hypogastric nerve from the first lumbar segment. The outer and postero-lateral surfaces of the thigh in about its middle third receive their cutaneous nerve supply from the lateral femoral nerve, from the second and third lumbar segments. The upper third of the intermediate zone on the front of the thigh is supplied by the lumbo-inguinal branch of the genito-femoral nerve, from the first and second lumbar roots. A small area of skin on either side over the body and ascending ramus of the pubes is innervated by the ilio-inguinal nerve from the first lumbar segment. The lower two-thirds of the intermediate and the lower third of the lateral zone on the front of the thigh, together with the lower third of the outer surface of the back of the thigh, receive their nerve supply from the intermediate cutaneous branch of the femoral nerve from the second, third and fourth lumbar segments. The medial third of the front of the thigh, from the ilio-inguinal area above to the knee below, is supplied by the medial cutaneous branch of the femoral, from the second, third, and fourth lumbar roots. Two small areas of skin on the inner side of the thigh, an upper one over the origin of the adductor longus, and a lower one at the medial side of the knee, are supplied by the obturator nerve from the second, third and fourth lumbar segments. The inner aspect and inner half of the front of the leg below the knee as far as the lower border of the medial malleolus are supplied by the saphenous branch of the femoral nerve, carrying nerve-fibres only, from the fourth lumbar segment. The anterior and lateral aspects of the outer half of the leg from below the knee to the level of the external malleolus, together with the skin surface over the posterior aspect of the inferior half of the lower leg, receive their innervation from the lateral sural cutaneous branch of the common peroneal from the fourth and fifth lumbar and first sacral segments. Fibres from the second sacral nerve, carried in the common peroneal trunk, are not represented in this nerve. The skin surface over the dorsum of the foot, except the integument

over the little toe, the tips of all the other toes, the adjacent halves of the first and second toes, and a narrow area along the outer border of the foot, is supplied by the superficial peroneal branch of the common peroneal nerve from the fifth lumbar and first sacral segments (fibres from the fourth lumbar and second sacral roots not being represented in the cutaneous distribution of this nerve-. The adjacent sides of the first and second toes are supplied by fibres from the deep peroneal branch of the common peroneal nerve from the fifth lumbar and first sacral roots. The outer margin of the dorsum of the foot and little toe receive their cutaneous innervation from the sural nerve, formed by fibres received by communicating branches from both tibial and common peroneal nerves from the fifth lumbar and first sacral segments of the cord. The skin surface over the dorsum of the tips of the toes is supplied by the internal plantar branch of the tibial nerve, the fibres coming from the first sacral root. On the sole of the foot the skin over the heel receives its nerve supply from the medial calcanean branch of the tibial nerve from the first sacral segment. The skin over the medial half of the sole and over the plantar surfaces of the first, second, third and inner half of the fourth toes is supplied by the medial plantar branch of the tibial nerve, while the integument of the outer half of the sole and over the outer half of the fourth toe, together with the plantar surface of the fifth toe, is innervated by the lateral plantar branch of the tibial nerve, the fibres in both cases coming from the first sacral segment. The posterior aspect of the thigh in its intermediate portion, as well as the posterior aspect of the upper half of the lower leg, receives its cutaneous nerve supply from the posterior femoral cutaneous nerve, the fibres arising from the first, second and third sacral roots.

The importance of these conceptions in the diagnosis of cord lesions and of herpes zoster in reference to the segmental innervation, and in the diagnosis of nerve palsies and peripheral neuritis with regard to the cutaneous nerve supply need only be mentioned here.

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"And of those things which are incumbent on the student of this Art (of medicine) are that he should constantly attend the hospitals and sick-houses; pay unremitting attention to the conditions and circumstances of their inmates in company with the most acute professors of medicine; and enquire frequently as to the state of the patients and the symptoms apparent in them, bearing in mind what he has read about these variations, and what they indicate of good or evil. If he does this he will reach a high degree in this art. Therefore, it behoves him who desires to be an accomplished physician to follow closely these injunctions, to form his character in accordance with what we have mentioned therein, and not to neglect them. If he does this, his treatment of the sick will be successful; people will have confidence in him and be favourably disposed towards him, and he will win their affection and respect and a good reputation; nor withal will he lack profit and advantage from them. And God Most High knoweth best."—*Haly Abbas.*

Sir Thomas Browne, the immortal author of *Religio Medici*, said that men could never become physicians from books, but "Galen and Hippocrates must be read as fathers and fountains of the faculty. Lay your foundation in anatomy; read also Vesalius, Spigelius, and Bartholinus; be sure to make yourself master of Dr. Harvey's piece De Circul. Sang., which discovery is preferable to that of Columbus; study plants, animals, the materia medicamentorum; be not a stranger to the useful parts of chemistry, and so by degrees march on. Having learned anatomy, read over two or three times Sennertus's Institutiones, after which you will seldom meet with any point in physic on which you will not be able to speak as a man. See how institutes are applicable to practice, but in reading satisfy yourself not so much with the results set down as with the true understanding of the nature of the disease, its causes, and proper indications for cure."—Letter to Dr. Henry Power, of Halifax.

THROMBO-ANGIITIS OBLITERANS. A PLEA FOR CONSERVATIVE SURGERY.

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THROMBO-ANGIITIS obliterans continues to be a source of great clinical interest, partly because the etiology remains obscure, but even more so because the end results obtained are so unsatisfactory that continuous efforts to open up new therapeutic approaches are being energetically pursued. It was first accurately described and recognized as a clinical entity by Buerger[1] in 1908, since which time he and others have added much knowledge regarding its clinical aspects, its pathology and its treatment.

The symptom-complex occurring in young adults, characterized by the presence of indefinite pains in the foot, in the calf of the leg, or in the toes, and, particularly, a sense of numbness or coldness in unfavourable weather; in fact, a group of symptoms passing through all the phases of ischaemic change up to gangrene, had been known by the name of presenile or spontaneous gangrene.

Two pathological explanations had been advanced. One, the theory of Von Winiwarter, who regarded the process as an endarteritis obliterans in which the closure of the vessels was attributed to a proliferation of the cellular and fibrous elements in the intima; the other, the theory of Von Manteuffel, who attributed the vascular occlusion to a primary arteriosclerosis in which the obliterative process owed its inception to the formation and extension of parietal white thrombi, caused by the desquamation of the endothelial cells lining the vessels. Buerger, by his work, was able to disprove both these theories, but it is remarkable how these former explanations are still advanced in discussions on the pathology of this condition.

The gross pathology, in a well defined case, shows that most of the arteries and veins of the extremity affected are obliterated over a large extent of their course. The primary occlusion is caused by the presence of large, obturating, red thrombi, which show, at times, a well defined upper and lower margin. One of us[2] has shown, in injected specimens, that these thrombi form patchy irregularities in their distribution throughout the vessel. These thrombi may become organized and so complete the occluding process, or they may become canalized and vascularized in such a manner as to help in re-establishing the circulation. These changes may be present in various stages in different vessels or in the same vessel. In some cases the veins show much more extensive involvement than the arteries. Another striking feature is the presence of a considerable amount of perivascular inflammation, both arterial and venous. This takes the form of a fibrotic thickening of tissues about the vessels; artery, veins, and frequently the nerve, being bound together in a mass of scar tissue.

The histopathology of the condition has also been well worked out, and to this we owe the thorough understanding of the disease processes. The earliest changes appear to be the usual evidences of an acute inflammatory disturbance affecting all coats of the vessel. The intima, media, adventitia, and perivascular tissues are infiltrated with polymorphonuclear leucocytes, and the lumen of the vessel is completely filled with red clot. Buerger has pointed out that certain peculiar giant-cell foci develop, which are characteristic. These cells may be found either in the vessel wall or in the thrombus in the lumen of the vessel. Their presence represents an intermediate stage in the progress of the inflammatory lesion, they being found as the acute stage is subsiding and chronic productive phenomena are beginning to make their appearance. The next stage shows a series of changes where chronic fibrotic processes control the picture. During this period the thrombus becomes organized and canalized. the evidences of the acute inflammatory disturbances disappear, occupying a minor position in the microscopic picture, and finally fibrous connective tissue is laid down in the vessel walls and in the perivascular tissue.

The above is a description of the pathology of the disease itself. Certain changes, however, are also going on in the affected limb as a result of the interference with the circulation. These changes are in the nature of an effort to establish a collateral circulation. As a vessel is blocked by the disease, attempts are made to furnish

blood to the part deprived of its supply by means of new vessels and channels. A struggle is thus constantly going on in the limb between the advancement of the disease and the attempt to re-establish the circulation. One or the other may gain the upper hand. If the progress of the disease outstrips the collateral vessel development, gangrene occurs. The question of collateral circulation is, therefore, one of great importance and will be discussed more fully later.

The clinical course and history of these cases are, as a rule, straightforward. The patient usually is a young male adult between 25 and 45 years of age; very often of Russian or Polish Jewish stock. The condition, however, is not exclusively confined to Jews. We have seen it in Englishmen, French Canadians, Syrians, and one[2] of us has reported twenty-five cases seen in China among the Chinese. The condition is fairly widespread in Japan, and sporadic cases have been reported among several other nationalities.

The disease manifests itself in its early stages in different ways. At times the patients will give a history of vague pain, either in the foot or toes. Occasionally, they will complain of a stinging "rheumatic" pain in the region of the tibia and calf of the leg. Others may only be conscious of the foot becoming cold and numb in cold weather, under circumstances in which a healthy foot would not react to the temperature to a similar degree. Again, crampy pains may appear in the muscles of the calf after walking (intermittent claudication). In one case seen by us the only history obtainable was of indefinite pain in the thigh, and yet the disease had progressed sufficiently to obliterate the pulsation in the dorsalis pedis artery. Some patients may give a history of pain and tenderness, with at times redness over many of the superficial veins of the extremity. These areas may show a tendency to disappear and reappear in an irregular manner. The name of migrating thrombophlebitis has been given to this condition, and Buerger considers these changes as almost pathognomonic.

These symptoms outline the preliminary history of the progress of the disease. They may persist for weeks, months or even years, only to be followed by a series of trophic changes resulting in ulceration or gangrene. The earliest manifestation of gangrene may be the development of a hæmorrhagic bleb, a pustule, or a dry dead patch of skin on or near the toes, or on the heel. The slightest trauma may be sufficient to usher in these changes. Preceding this there is often intense pain, indicating the progress of the vascular obliteration to a point where the gangrenous process might be initiated at any moment.

At any stage with the above mentioned symptoms a new and characteristic sign may make its appearance. This is a peculiar blush of the toes and dorsum of the foot, sometimes extending to the ankle, or slightly above it. It is best shown with the foot in the dependent position. The affected toe is the first to change colour. It becomes a bright red and this gradually diffuses over the area previously indicated. This colour change is called "rubor," or "erythromelia." Associated with this redness, there is a marked increase in the local pain. At this point the disease may rapidly advance to actual gangrene or, adequate collateral circulation developing, the symptoms may subside. Erythromelia is undoubtedly due to a dilatation of the superficial capillaries, probably in response to the anæmia produced by the obliterating vascular processes. It is our opinion that the establishment of rubor marks a critical point in the progress of the disease.

Physical examination at this stage will show, in addition to the rubor and possible ulceration, a loss of pulsation in one or more of the palpable vessels of the extremity. Thus, the dorsalis pedis artery alone may be pulseless, or the lack of pulsation may extend to the tibials, popliteal, femoral, or even to the iliac vessel. The affected limb is of a lower temperature, feeling cold to the palpating hand. It will further be possible to demonstrate a phenomenon which is pathognomonic of organic vascular occlusion. Elevation of both limbs simultaneously will show a marked degree of pallor in the affected limb in comparison to the healthy limb. Depression of both limbs will show a much slower return of the pink colour to the diseased member, this pink gradually deepening into the rubor previously described. The contrast between the two limbs, is, as a rule, marked. We have already stated that the limb may show the reddened, tender, indurated areas along the course of a superficial vein, indicative of the migrating thrombo-phlebitis, and if the ulcer or gangrenous patch has become infected, a well marked lymphangitis or cellulitis with œdema may be present. Although reference has been made largely to the lower extremity, it must be under-

stood that the vessels of the upper extremity may also be affected.

Recent work has been carried out with the Pachon oscillometer. This instrument records a smaller range of oscillation in the affected than in the normal limb.[3]

We have already referred to the progress of the disease as a struggle going on between obliteration of vessels and re-establishment of new channels. We believe a thorough understanding of this feature of the disease to be essential. Its course is not one of a smooth uninterrupted progression. We feel that characteristic of the condition is a series of exacerbations and remissions. With each exacerbation more and more vessels are obliterated. The disease advances proximally. The subsidence of the symptoms produced by the vascular obliteration would indicate that enough collaterals have been opened up, thus preventing the anæmia from progressing to the stage of gangrene. So it will be seen that the progress of the disease is uneven and that this struggle may go on for a number of years, until finally the disease is arrested, or gangrene supervenes.

It is evident that any rational therapeutic approach must consider two factors. First, the removal of the cause, and, secondly, the development of the collateral circulation, so that the impending gangrene may be averted. In regard to the first factor the etiology of the disease remains obscure. Many theories have been advanced; all have been found wanting.

The suggestions of excessive smoking,[4] exposure, the increase in the viscosity of the blood,[5] the use for food containing vaso-constrictors,[6] such as rye fungus, alterations in blood chemistry[7] and changes in hæmatological findings,[8] endocrine disturbance,[9] and finally the bacteriology of the disease,[10] have all received their share of attention, but have failed to find confirmation. The work of Rabinowitz is worthy of comment in view of the recent revival of theory of the specificity of micro-organisms in various diseases. We are, however, faced with the striking lack of confirmation of this work. The lesion undoubtedly appears to be of an inflammatory nature and further work along bacteriological lines would be of interest.

Supporters of these various theories of the cause of the disease have advanced methods of treatment intended to act upon the respective etiological factors, so that dietary restriction, organotherapy, intravenous use of solutions to diminish viscosity of the blood, have all played their part in the therapy of this disease. The majority have failed to survive a thorough test. We are consequently faced with the necessity of evolving measures to promote the establishment of an efficient collateral circulation, realizing that the impending gangrene could be prevented and the co-incident pain relieved by supplying blood to the ischaemic areas. Those cases that show spontaneous arrest of the disease over periods varying from one to several years have been shown to have established a well developed collateral circulation. Therapeutic measures along these lines can do no better than to imitate Nature's method.

These measures may be divided into two groups. First, those which aim, by some mechanical measure, to produce rapidly an efficient collateral circulation. An example of this type is the ligation of the femoral artery, as advocated by Lewis and Reichert.[11] Secondly, those which aim at the relief of pain. Pain is the symptom which will most often serve as the indication for operative interference. Relieve the pain and the natural tendency towards the formation of a collateral circulation will be allowed to proceed without interruption. In discussing the first group, mention might be made of the operations formerly attempted with the object of increasing the blood supply to the anæmic area. These are the operations of ligation of the femoral vein[12] and arteriovenous anastomosis.[13] Both of these, however, were based upon an improper understanding of the pathology of the disease, and naturally found no place in its treatment,

The work of Lewis and Reichert[11] was the first rational attempt to surgically assist the compensatory mechanism of collateral circulation to develop. We feel, however, inclined to doubt the efficiency of ligation of the femoral artery. In the irregular progress of the disease one attack of arterial obstruction follows on another, each attack presumably obliterating a portion of the vessel at a little higher level. This corresponds then to repeated ligation of the artery. It is difficult to see how ligation of the vessel at one spot will do more than what amounts to repeated ligation, as evidenced in the progress of the disease. It is apparent, too, that Lewis' operation is applicable only to those cases in which the femoral artery in Scarpa's triangle is patent. This would naturally limit the scope of the operation. We have so frequently found the femoral artery obliterated in its whole course that

we look upon those cases as the exception rather than the rule. It is possible that Lewis and Reichert based their operations on the conclusions of Halstead,[14] namely, that the higher the ligation the greater the possibility of a sufficient collateral circulation being established. Halstead's work, however, was based upon experiments where the vasculature distal to the point of ligature was a healthy one. In Buerger's disease the opposite obtains. The vessels distal to the ligature are in the majority of instances thrombosed and obliterated.

We have, however, to account for the fact that improvement has followed on Lewis' operations just as improvement has been reported to follow other operations designed to alleviate this condition. How can we explain these results? We know that the advance of the disease, each new extension of the obliterating process, deprives the extremity of blood, thereby producing great pain. As a rule, at this stage, the patient will present himself for treatment. We know that coincident with the occlusion collateral circulation begins to be established. Irrespective of any operative procedure, the process of collateral establishment will proceed as rapidly as it can. We feel, therefore, that the majority of these measures, regardless of their rationale, act only by relieving pain, and in no way tend to mechanically assist in collateral development. We cannot attempt, at present, to fully explain the relief of pain brought about by periarterial sympathectomy, ligation of the femoral vessels, intravenous injections of hypertonic saline, foreign protein therapy, etc., but we feel that in this relief lies the true value of their action.

Based upon our understanding of the disease, as explained in the foregoing paragraphs, we feel that conservatism should be the keynote in the treatment of this condition. It is only a very few years ago since high amputation was considered the treatment of choice, irrespective of the extent of the gangrene. It is interesting to see how gradually the surgical mind as regards this radical procedure has undergone a change. In a personal communication to one of us, Silbert of the Mount Sinai Hospital of New York City stated that he had reduced the percentage of cases coming to amputation from 70 per cent to 12 per cent by means of conservative treatment. The figures from the department of surgery of the Royal Victoria Hospital show that during the last ten years a total of nineteen cases were admitted suffering from thrombo-angiitis obliterans. Of these nineteen admissions the last five were treated along purely conservative lines. Of these five only one up to the time of writing has required amputation, and that on account of the presence of a fairly extensive gangrenous area developing on the dorsum of the foot. Of the fourteen cases treated prior to the last five admissions, and before the adoption of prolonged conservative treatment, eleven, or 79 per cent, underwent amputation, eight requiring bilateral amputation. These striking figures illustrate well the possibilities that can be obtained by treating these patients by the most conservative means available.*

We have already made brief mention of certain measures which have been tried in this condition with apparently good results. From our own experience, and from an extensive study of the results obtained by others the following mode of procedure is suggested:—

1. Rest.

2. Dietary restriction and absolute restriction of tobacco. The belief is prevalent in the larger clinics that tobacco smoking as an etiological factor is not to be minimised.

3. *Buerger's exercises.* These exercises tend to mechanically improve circulation in the affected extremity. They consist of elevation of the leg for the minimum amount of time necessary to produce ischaemia (30 seconds to 3 minutes). The leg is then put down over the edge of the bed and kept there for one minute after the maximum red colour has been produced. (2-5 minutes). The leg is then placed in the horizontal position for from three to five minutes, during which time dry heat is applied. This group of movements is repeated during an hour and every alternate hour is taken up in this way. During the rest period dry heat is applied continuously. It is very difficult to obtain a patient's co-operation for the proper carrying out of these exercises on account of their tediousness. A cycle of these movements every third hour will probably be of some benefit, without unduly taxing the patient.

4. Intravenous injection of hypertonic saline. It has been found in some clinics that 300 c.c. of

* Since writing the above it has been necessary to amputate an extremity of one of the patients, who had been treated by conservative means. It is noteworthy that this patient had refused to stop smoking or, to come regularly for treatment. The oscillometer readings in this case were very low and periarterial sympathectomy had been tried in an effort to relieve the pain without result. The femoral artery was shown to be obliterated at this operation.

5 per cent saline, injected intravenously, will help to relieve pain. This is given three times a week until definite relief occurs.

5. Allen and Browne[15] have produced increased warmth in the extremity with relief of pain by the use of typhoid vaccine in sufficient quantities to produce a sharp general reaction.

6. During the acute period when pain fails to be relieved by any of the above procedures, or by the use of the ordinary drugs, (morphine, aspirin, codeine, veronal, etc.) periarterial sympathectomy may be attempted. Good results have also been reported following lumbar ganglionectomy. We do not feel that much benifit can be expected from these procedures.

7. Frequently, when the condition is improving and the pain has subsided, we are left with a patch of gangrene affecting one of the toes. This can be locally excised or the toe amputated. Healing will rarely take place by first intention but the wound will slowly granulate and eventually cicatrize.

SUMMARY

Thrombo-angiitis obliterans partakes of all the phenomena of an inflammatory disease affecting blood vessels, nerves, and perivascular tissues of the extremities. Its progress is characterized by a series of exacerbations and remissions of varying length and varying result. Relief of the condition will depend upon the establishment of an efficient collateral circulation. Conservative measures of treatment will tend to permit the establishment of this collateral circulation. By use of these measures high amputation will be necessary in a much smaller number of cases.

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ETHYLENE ANÆSTHESIA*

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THERE is nothing new in the idea of using ethylene as a general anæsthetic. Twenty years ago Luckhardt, to whose work, chiefly, we owe this agent, began animal experiments with it, proving it to be non-toxic, analgesic and anæsthetic. At that point the work was dropped, but early in 1923 attention was again drawn to ethylene by Easson Brown in Toronto, and by Luckhardt and Carter in Chicago.

Brown, whose attention had been attracted to ethylene by the statement that it was one of the impurities in a commercial ether, read a paper in Toronto, describing some animal experiments with ethylene, which paper was published in the *Canadian Medical Association Journal*.†

About the same time, Luckhardt's work had progressed to the point where he and Carter arranged a demonstration of ethylene anæsthesia on laboratory animals, and on some volunteers, before a group of Chicago surgeons and anæsthetists, and a few days later on March 14, 1923, ethylene as an anæsthetic for a surgical operation was given for the first time by Dr. Isabella Herb in the Presbyterian Hospital there.

The anæsthetists at the Presbyterian Hospital have always been strongly opposed to the use of premedication, and consequently were even more handicapped by the shortcomings of nitrous

* Read before the Winnipeg Medical Society, May 4, 1928.

† March, 1923, xiii, 210.

oxide than others were. This probably accounted in some measure for the very enthusiastic reception accorded this new agent, both by anæsthetists and surgeons there.

Six or seven months later, at the International Congress of Anæsthetists in Chicago, ethylene was the centre of interest, and certainly the most talked-of subject, but at that time the general opinion seemed to be that methods of manufacture were not sufficiently standardized, and that ethylene anæsthesia was still more or less in the experimental stage. Since that time methods of manufacture and technique have progressed until now the use of ethylene has spread to every clinic and hospital of importance in the United States, and to many hospitals in Canada, and it can be said to be as definitely established as any other anæsthetic agent.

The method of manufacture is of little interest to us, but some of its physical characteristics are worthy of attention. It is a gas at ordinary temperatures and pressures, but is stored in liquid form in tanks, as nitrous oxide is, under considerable pressure. It is, like ether, highly soluble in fats, a lipoid solvent. Its boiling point is –157 F., lower than nitrous oxide which is –137 F. Ethylene is very rapidly eliminated on account of its low boiling point, although its affinity for fats makes its elimination somewhat slower than nitrous oxide with its somewhat higher boiling point. It seems to exist in the blood merely in a state of solution, apparently not combining with the hæmoglobin.

Ethylene, speaking generally, occupies a place in the scale of anæsthetic potency about midway between nitrous oxide and ether, partaking to some extent both of their advantages and disadvantages, but bridging what was previously a rather awkward gap between them.

To begin with the disadvantages. One cannot help mentioning the odour, because it is the first thing to attract attention. It has been described by almost everyone as unpleasant, but perhaps the most striking thing about it is the ease with which one becomes accustomed to it. So far as patients are concerned, I have never heard one complain of the odour. One may induce anæsthesia with nitrous oxide if desired, but, in any case, induction with ethylene is so rapid that one or two breaths are all the patient will notice. The other and the only serious objection to ethylene is its explosive character. This is a very real danger, and definitely rules out the use of ethylene in cases where cautery or flame of any sort may be present or used. It is also impossible to use ethylene in the presence of diathermy apparatus, x-ray machines, and other electrical apparatus from which sparks may be given out. There is also danger from static sparks. At the same time, while unfailing caution must be exercised, one should realize that the danger of explosion is within certain definite limits, and is really probably no greater than with ether vapour. In this connection we may remember that the combustible range for ether vapour, as given by the Bureau of Explosives, lies within the limits ordinarily used in anæsthesia, while that for ethylene lies far below the mixtures required for narcosis. A good many of the explosions reported, and they are not many after all, have occurred when the apparatus was not in use, from ethylene left in the breathing-tube and mask, and they could have been prevented by shutting the ethylene tank valve, exhausting all the ethylene in the machine, and flushing the tube and mask with nitrous oxide before finishing the anæsthetic.

Ethylene itself, in the cylinder, and until it has been mixed with oxygen, cannot explode. Mixtures in common use contain from 10 per cent to 25 per cent oxygen, and Easson Brown has determined experimentally that the minimum amount of oxygen necessary for a mixture to explode was from 40 to 45 per cent, mixtures from this percentage up giving increasingly violent explosions. It is almost out of the question for escaped ethylene to reach explosive proportions in the air of an operating room. It has been estimated that it would require six hours of continuous anæsthesia, with no ventilation, for the atmosphere to reach the required percentage. McKesson thinks that ethylene is probably less explosive than ether vapour under ordinary operating conditions.

The general opinion is that if reasonable care is taken and is *always* taken, ethylene is as safe as ether, so far as explosion is concerned. This does not mean, however, that one can ever relax his vigilance. It is the easiest thing in the world to drop into the familiarity which breeds contempt, and one must draw a definite, hard-and-fast line in connection with the use of ethylene.

The advantages of ethylene are many. As stated before, induction is very rapid, and not unpleasant. There is practically never the excitement that one occasionally sees with

nitrous oxide, which has gained for that anæsthetic agent the term "laughing gas." The ease and rapidity of induction with ethylene are of special value in dealing with alcoholics, drug addicts, and other extremely nervous people.

The relaxation obtained with ethylene is one of its marked advantages over nitrous oxide, though it falls short of ether in that respect. It resembles ether in that the relaxation is not obtained immediately, but approaches its maximum only after ten minutes or longer, and for this reason, in cases requiring relaxation, the anæsthetic should be begun as early as if one were using ether. We have found ethylene so much superior to nitrous oxide in this respect that it has eliminated almost entirely the need for adding ether to gas anæsthetics in the case of laparotomies. The relaxation which can be obtained is such that it has been found possible to repair a perforated duodenal ulcer under pure ethylene-oxygen anæsthesia. You will realize that this implies both relaxation from the anæsthetic, and cooperation from the surgeon. As a matter of fact, it is never possible to use gas-oxygen anæsthesia without this latter factor.

The colour under ethylene differs greatly from the dusky, often cyanotic, hue under nitrous oxide. It is usually a bright rosy pink, accounted for to some extent by the increased oxygen percentage permissible with ethylene, over that possible with nitrous oxide, but it has been suggested that it is due to a lowered tissue metabolism under ethylene, in which less oxygen is drawn from the blood. If that is true it may be a factor in its evident advantage in toxic goitres.

In the matter of blood pressures there is some difference of opinion, but most anæsthetists agree that there are no changes in readings, under surgical anæsthesia, in normal patients, *if the element of asphyxia is eliminated.* The following statements may be quoted.

"As ethylene is known to have little effect on the blood pressure it is well suited for the cardio-vascular, nephritic and diabetic patient." (Donald Guthrie.)

"In the absence of hæmorrhage there is little change in blood pressure, whereas in cases of hypertension the tendency to a reduction is usually well-marked." (Hastreiter.)

"The blood pressure is lowered in deep anæsthesia, unchanged in others. The pulse and blood pressure are influenced less by ethylene than by any other agent." (Christiansen.)

"It is without marked effect on ordinary blood pressure. In chronic hypertension pressures may drop almost to normal level under ethylene, without danger, provided the pulse rate decreases also."

It has been stated by some observers that there is an increased oozing from superficial tissues. Others deny this, and have reported several series of cases in which the bleeding-time and coagulation-time were taken before, during, and after ethylene anæsthesia, and practically all report that both are decreased during anæsthesia. This condition usually becomes more marked following anæsthesia, and persists until the following day when the times become normal. This was especially noted in a series of jaundiced patients, and should it prove true, is a most important observation.

There is no pulmonary irritation with ethylene. It may be given with safety in acute respiratory conditions, and is especially valuable in some of these, as for instance, in acute abdominal conditions, with pneumonia, where nitrous oxide is usually insufficient without the addition of some ether. Ethylene has been given in many thousands of tuberculous patients for varied procedures with no lighting up of quiescent lesions or aggravation of active ones.

There is no effect on the kidneys, and ethylene may therefore be used for nephritics as safely as nitrous oxide. It is said that ethylene is the only agent which does not decrease the CO_2 combining power of the blood, and that it in fact increases it, which should increase its use in diabetics.

The heart action does not seem to be affected by ethylene, and the slower respiratory rates, with their accompanying slower pulse rates, must be beneficial to patients suffering from heart lesions.

It is said that ethylene produces less post-operative shock, both immediate and remote; less headache than that frequently following nitrous oxide; less vomiting, nausea and general discomfort than following ether, though somewhat more than that following nitrous oxide. Gas-pains have been said to be less than after ether and chloroform anæsthesia. Patients with low hæmoglobin percentages do well on ethylene; better than on nitrous oxide, because of the larger percentage of oxygen given. In fact, we

have a decided impression that the larger amount of oxygen is responsible for most of the benefits, since we believe that the element of relative asphyxia is responsible for many of the post-anæsthetic discomforts and dangers.

Sweating is usually noticeable under ethylene by its absence, the skin being warm and dry, and this is a decided advantage in the dehydrated patient. It is astonishing how much fluid the sweating patient can lose in the course of an hour or more.

Experimentally, on isolated uterine muscle, ethylene is the only anæsthetic which does not show an inhibiting effect on contractions. Whether or not this holds good in obstetrical practice I do not know, but ethylene appears to have no deleterious effect on mother or child. My experience with it in obstetrics is too small to base upon it any opinion as to its relative value.

Surgical anæsthesia from ethylene presents a patient whose condition more closely approaches the normal than is the case with any other anæsthetic agent, with rosy colour, slow regular respirations, slow, regular, full, pulse, no mucous or salivary secretion, usually good relaxation, and a warm, dry skin. Recovery from the anæsthesia is rapid, though vomiting is somewhat more common than with nitrous oxide. Recovery is not quite so sudden and complete as it is with nitrous oxide, where the patient is sufficiently conscious to appreciate a good deal of the more acute pain of his wound. Ethylene appears to leave a persisting analgesia behind it, which makes people somewhat more comfortable. Convalescence is definitely shortened with ethylene, as with nitrous oxide; these two gases usually shorten the hospital stay of patients by a day or two.

With all this information available for some time, the curious thing is, not that ethylene anæsthesia was introduced into St. Boniface Hospital in January of last year, but that none of us had done it long before. When we spoke of buying a McKesson gas machine a year earlier, we suggested to Dr. Fahrni, the chief of our surgical staff, that we might get one with an ethylene attachment. With his encouragement, we did. But later, when we decided to try ethylene, we had quite unexpected difficulty in getting any to try. One firm assured us that the railroads and express companies in Canada would not carry ethylene, and, that they themselves were decidedly not interested in handling it. The trouble was mentioned to Mr. Martin, then of the Surgical Supply Company, and a tank of ethylene was delivered in short order, and there has been no further trouble in obtaining it.

After fifteen or sixteen months' experience, our ideas about ethylene have become more or less crystallized. We usually induce anæsthesia with nitrous oxide-oxygen, but find straight ethylene-oxygen very valuable in alcoholics, and all highly nervous people. Probably it is as good a routine as to induce with nitrous oxide, but we feel that we have more or less accidentally avoided some of the dangers of explosion by this method, as we have been careful to flush out all ethylene from the machine before leaving it. This leaves it free from odour for the next patient, and also obviates to some extent the danger of explosion from static sparks when the machine is idle.

We think ethylene is definitely indicated in the extremes of life (it has been used in patients from three days to eighty-four years old), in septic cases of all kinds, and in anæmic patients. We think that almost all laparotomies in which it is proposed to use gas-oxygen, either on account of some definite indication or from preference, are better done under ethylene than under nitrous oxide. But the type of case in which we think ethylene is really invaluable is in the toxic goitres. Here are people who are really short of oxygen when they are breathing air with its 20 per cent content. Imagine how they find themselves, breathing an anæsthetic mixture of nitrous oxide and 10 to 15 per cent of oxygen, which is the average amount permissible, even with the additional help of novocain. Within a very few minutes these patients present a very unpleasant picture. The relative anoxæmia under their greatly increased oxygen requirements, results in a greatly increased respiratory rate, the pulse following the respiratory lead; the patient is perspiring and cyanotic, and the anæsthetist feels much more miserable than most of you even imagine. Think, too, of the purely physical exhaustion induced by breathing forty or fifty times a minute, for forty minutes or an hour or even more; then think of the strain on a heart which is trying to keep up with a situation like that. Imagine watching patients like that for years, wondering what one could do to change the

XUM

picture, and then some morning turning a valve and altering the entire appearance in the space of three or four breaths. It is hardly possible to understand how sudden and how gratifying this change is without seeing it. On one occasion, for instance, the machine with the ethylene was not available for ten minutes or more after I anæsthetized with nitrous oxide a fairly sick exophthalmic goitre patient, and during this ten or twelve minutes under nitrous oxide oxygen, even with the oxygen pushed to the point of very light anæsthesia, the respiratory rate quickly reached 48 per minute, with the pulse racing along trying to keep pace with it, at 140. When the switch to ethylene was made, the second breath sounded so different that the surgeon said, having had experience with this before, "What has happened; has the ethylene come?" Beginning with the third respiration under ethylene the respiratory rate was 28, and later dropped to 24. The respirations gave one an impression which cannot be described better than by saying that it sounded as though they satisfied the patient. The pulse quickly followed suit, dropping to 120, then to 110, staying between that and 100 for the rest of the operation. This change was so marked and so constant in our earlier goitres under ethylene that we now either carry them through entirely under ethylene-oxygen, or turn to that, after starting them with nitrous-oxide, as soon as unconsciousness is attained. Our habit of flushing out ethylene with nitrous oxide just before the end of an operation is perhaps not good practice in these people, for one often sees them "steam up" again, even with these few breaths of nitrous oxide, but it is in the interests of safety.

We are very decidedly of the opinion that ethylene is the anæsthetic of choice for goitres which have any degree of toxicity. It has been possible to carry practically all our goitre cases with 20 per cent oxygen, and in many, particularly of the more toxic ones, the percentage can be increased to 25, 30, or even 35 per cent, with satisfactory anæsthesia. The reflex spasms which fairly often occur in goitre work, and which should be merely momentary embarrassments under light anæsthesia, often develop into very unpleasant situations when the patient is under deeper anæsthesia. This light anæsthesia, so important in the cases in which the trachea is often distorted or compressed to some extent by manipulation, and in which the nerves may be irritated indirectly by traction or pressure, even though they may never be directly irritated, is much more easily and more evenly maintained with ethylene than is a similar stage under nitrous oxide.

We have, in fact, almost arrived at the point where we feel that any case for which nitrous oxide is advisable will do better under ethylene; and we have quite arrived at the point where we must say that the range of gas-oxygen anæsthesia has been extended to include numerous patients who were formerly outside it.

It is a great satisfaction now to know that, while Dr. Richardson, formerly senior interne in St. Boniface Hospital, introduced the use of ethylene, and nitrous oxide as well, in Brandon, nearly a year ago, the use of ethylene is becoming more general in Winnipeg.

We would like to take this opportunity of expressing our great appreciation of the hearty co-operation and support which the surgical staff particularly, and many visiting surgeons, also, at St. Boniface Hospital, have given us in this matter.

A case of functional aphasia.—"The celebrated St. John of Beverley, being accustomed at the beginning of Lent to seek out some specially sick or poor person to whom he might do good, found a boy who was completely dumb, so that when he came to the bishop to receive alms he could not speak a single word. He was, however, as appears, not deaf. Besides this, he had so much scurf and scab on his head that no hair would ever grow there, but only some bristly locks were seen standing round about it. The bishop provided a lodging for the youth near his own house, and on a certain day called him before him, and making the sign of the cross on the dumb boy's tongue said, 'Pronounce some word; say Gae (yea).' The boy immediately said what he was ordered. The bishop then added the names of letters. 'Say A.' He said A. 'Say B,' and he said this also. And when he said after the bishop the names of the letters, the latter proceeded to put syllables and words for him to say. And when he had repeated all these properly, he desired him to say whole sentences, and he did so, and went on talking the whole of that day and part of the night, so that he was completely cured."—Dr. Payne, Fitzpatrick Lectures, 1903.

Case Reports

DOUBLE FRACTURE OF THE MANDIBLE PREDISPOSED BY AN IMPACTED THIRD MOLAR

BY DR. W. AUBREY CRICH,

Dental Department, Lockwood Clinic, Toronto

Mr. F., aged 22 years, came to the Lockwood Clinic on January 30, 1928, on account of pain and swelling at the angle of the jaw on the left side and inability to use his lower jaw.

History.—On the afternoon of January 21st, he had been boxing and had received a heavy blow on the left side of his chin. This blow had lifted him off his feet, had dazed him a little, but had not terminated the bout. His mouth had bled, and he had spat considerable blood. He experienced difficulty eating that night, but was able to move his lower jaw sufficiently to eat soft food. The jaw became more painful during the night and began to swell at the angle on the left side. Pain was not severe at any time, but the lower jaw became stiff and after a day or two he found that he could not use it, neither could he bring his anterior teeth together. Several days later a painful swelling appeared in the bicuspid area on the right side of the mandible. This drained and the pain disappeared.

Examination.—The patient was a well-nourished individual. He had considerable swelling at the angle of his lower jaw on the left side, and could not open his mouth on account of trismus of the muscles of mastication. The anterior teeth were not in occlusion, the greatest amount of separation being in the region of the first bicuspid on the lower right side. The lower posterior teeth were fairly well up in occlusion. On manipulation, definite movement of the mandible could be seen between the lower right bicuspid teeth. Pain in this area, and also in the area of the angle on the opposite side, was increased by the slightest movement of the mandible. The lower right first bicuspid tooth was slightly loose. There were no areas of anæsthesia present, therefore no injury to the inferior dental nerves, nor any ecchymosis. It was difficult to obtain a good view of the lower left molar area, but the third molar was seen to be missing. There was no break in the mucous membrane in this area.

Diagnosis.—With these clinical signs, a diagnosis was made of double fracture of the mandible, compound on the right side, and probably simple on the left side. Extra and intra-oral x-rays confirmed the diagnosis. The fracture at the angle was seen to be complicated by an impacted third molar which was lying in a horizontal position, with its crown lying in the line of fracture. The x-ray showed that there was little displacement in this area. The line of fracture on the right side was shown just distal to the first bicuspid and extended down through the socket of this tooth. Reduction of the fractures was advised after the removal of the lower right first bicuspid tooth.

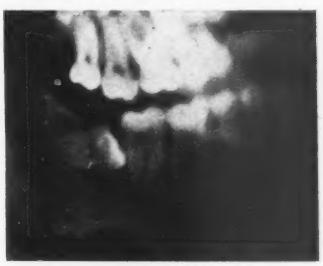

FIG. 1.—An x-ray showing an impacted third molar lying in the line of fracture. The injury was the result of a blow received on the left side of the jaw during a boxing bout.

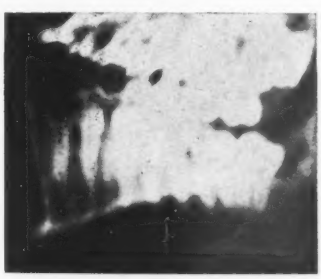

FIG. 2.—An x-ray showing the fracture just distal to the second bicuspid which occurred on the opposite side in the case described in Fig. 1.

TREATMENT

The lower right first bicuspid was removed under local anæsthesia. The occlusion was studied and it was seen, from the abrasion of the incisal edges of the central and lateral incisors, that the patient's teeth had not been in perfect occlusion. This was interesting, as the most certain guide for restoration of the fragments to their normal position is the restoration and main-

tenance of the teeth in their normal occlusion. Gilmers "modified method" of wiring the lower teeth to the teeth of the upper jaw was the method of choice. Fixation of the splints and reduction of the fractures is most satisfactorily accomplished under the influence of $\frac{1}{6}$ gr. of morphine sulphate and 1/150 gr. of scopolamine.

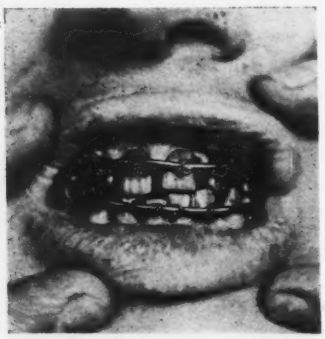

FIG. 3.—Gilmer's modified method of wiring the lower teeth to the teeth of the upper arch in a fracture of the mandible.

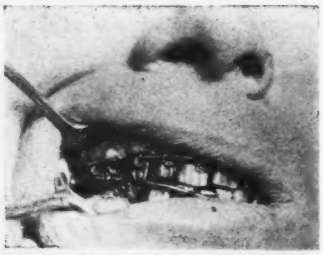

FIG. 4.—Side view showing the method used in wiring the lower teeth to the teeth of the upper arch in a fracture of the mandible.

On February 1st, splints in the form of arch wires of fourteen gauge German silver wire were made to conform to the buccal surfaces of the teeth in the upper and lower arches, extending from the first molar on the left side to the corresponding tooth on the opposite side. The arch wires were annealed, polished, and sterilized before being used. The ends of the upper arch wire were bent downward to make a small loop in order to lessen irritation of the tissues, while the ends of the lower arch wire were looped upwards. Twenty-five gauge German silver wire was used as "interlacing wire," to fix the arch wire to the teeth. The arch wire was fixed to each tooth in the upper arch, from the first molar on the left side around to the corresponding molar on the opposite side. The interlacing wires were passed between the teeth above the contact points, one end being brought out below the arch wire, the other end above it. The ends of the wires were then twisted together and a pair of hæmostatic forceps was used to tighten these, care being taken to draw the ends of the wires away from the tooth, thus avoiding breakage. Final tightening of the wires was not done until all the wires were in position. A small pair of curved hæmostatic forceps was used to guide the ends of the interlacing wires through the interproximal spaces. The ends of the twisted wires were cut rather short, and then bent to form a small loop, the end being tucked under the arch wire. The lower arch wire was fixed to the lower teeth in a similar manner, the wires passing through the interproximal spaces below the contact points.

Double thicknesses of interlacing wires were used as reduction wires. The reduction wires were passed under the arch wires in chosen positions, so that when force and tension were exerted upon them the teeth would be brought up into their proper occlusion and the fractures reduced. (All the reduction wires should be in position before final reduction is made.) On tightening the reducing wires, the teeth came into occlusion. The ends of these wires were carefully bent, in order to prevent irritation.

The patient was advised to keep his mouth as clean as possible. A 50 per cent solution of stock hydrogen peroxide is a good mouth wash. A small tooth-brush may be used to good advantage, to prevent the collection of debris about the wires. Pledgets of cotton saturated with hydrogen peroxide should be rubbed over the teeth and mucous membranes twice daily in such a case.

The lower cuspids being conical in shape, the interlacing wires on these teeth became loose in the course of a day or two and were removed. The removal of these wires did not affect the stability of the lower arch wire. Five days following reduction the patient experienced more swelling, accompanied by pain at the angle on the left side. He was advised to apply hot moist compresses over this area and to use a warm mouth wash. The swelling was greatly reduced by the following day. On February 18th the reduction wires were cut and the case studied. The patient was able to open his mouth about one half inch after practising a few minutes. Gentle massage was given to the fractured areas. Some of the interlacing wires were tightened and the reduction wires again replaced. On February 28th the splints were removed, and the patient was cautioned against using his jaw too vigor-

ously. Following removal of the splints, more swelling appeared at the angle of the jaw and the glands in the side of the neck felt hard on palpation. A small quantity of pus could be expressed from the gingival crevice, just anterior to the second molar. Hot moist compresses were applied to this area until fluctuation could be detected, and then extra-oral drainage was obtained. The wound drained for six days and then healed. Since that time the jaw has been functioning normally and the patient has had no discomfort.

DISCUSSION

This case is particularly interesting on account of the impacted lower left third molar. Local predisposing causes of fracture of the mandible are usually tumours of bone, such as sarcoma or carcinoma, or, even more often, cysts, osteomyelitis, or gumma, but in this case it was an impacted molar.

Before attempting reduction here, one had to decide what should be done with regard to this impacted tooth. The common rule is to remove teeth in the line of fracture. In order to remove this tooth some of the bony tissue overlying the tooth would have had to be removed. This would have meant weakening the short fragment, and would also have caused considerable trauma to the tissues. This tooth could not have been removed without getting more infection into the wound, which would have interfered with healing. If the roots of the impaction had been lying in the line of fracture, the shock would possibly have caused the nerve of the tooth to die, and the tooth would then have had to be removed. Loose teeth or roots in the line of fracture should always be removed. (Removal of this impacted tooth has been advised and will be done about six months later.)

Nearly all fractures of the jaw are compound, hence usually become infected. Hot moist compresses applied to the outside tend to combat the infection or cause it to localize. The abscess should be opened as soon as fluctuation can be detected. This is most satisfactorily accomplished under nitrous-oxide anæsthesia. A general anæsthetic should never be given with the reduction wires in position. A small incision should be made in the skin, and then a blunt dissection down to the periosteum made with a pair of scissors. A few thicknesses of sterile rubber tissue placed in the wound will insure good drainage. Although the fracture at the angle in this case was thought to be "simple," it no doubt became infected by seepage of saliva into it by way of the gingival crevice around the second molar. A culture taken from around the crown of an unerupted tooth, such as this, always shows the presence of a mixed type of infection. Slight swelling usually persists in these areas for a few months, and it is advisable to inform the patient of this fact.

Anyone who has not seen fractures treated by this modified method of Gilmer's might think that the interlacing wires would cause considerable trauma to the gingival tissue. This is not the case, and it is surprising to see how little irritation the wires cause. When the reduction wires are tightened, they tend to draw the arch wires toward the occlusal surfaces of the teeth and hence the interlacing wires away from the gingiva. If the ends of the wires are carefully bent and tucked under the arch wires, the lips and buccal membranes will not be irritated. If one is afraid of this, dental compound may be used to round over these ends.

Whenever there are a few sound teeth in the opposing jaws, this method, in my estimation, is the most satisfactory. These splints are easily placed in position, whereas the patient is caused much discomfort in taking impressions in order to make either swaged or cast splints. With this method of wiring it is possible to study the occlusion of the teeth at all times, as there is no thickness of metal between the upper and lower teeth. The method also saves the patient money, and, as most fractures of the jaw occur in the poorer classes, this fact should be taken into consideration. In cases of nausea or sickness the reduction wires may be easily cut, the mouth opened and again reduced. If one or two interlacing wires should break, they may be ignored, whereas with other methods of wiring they must be replaced.

About 1 per cent of all fractures recorded are of the mandible, while about 0.5 per cent are of the maxilla. This case is a common type of fracture, as the point of impact of the breaking force was situated midway between the two points of fracture. When there is a fracture at the angle, the break is usually anterior from below upward, and at an angle of about 60°. The mandible is almost as frequently fractured in two places as in one place only, the fractures usually occurring on opposite sides. Fracture of the mandible most frequently occurs in the mental region. The bone in this area is weakened to a certain extent by the mental foramen and also

by the peculiarly attenuated internal structure of the bone at this point. This position is also the middle of the curve in the body of the jaw. Other common sites are: (1) the angle of the jaw; (2) between the angle and mental foramen; (3)symphysis menti; (4) ramus; (5) condyloid process; (6) coronoid process.

It is never necessary to extract, to provide space for the passage of food in the case of a patient wearing interdental splints or where the upper and lower teeth are wired together. Fluids and soft foods may always be taken either through places where teeth have previously been lost or behind the last molar. On the day following reduction, this patient reported that he could take fluids, and that he had no trouble in taking cream of wheat, mashed potatoes, ice cream, etc. He was able to talk and had no difficulty making himself understood, and was only away from his work for a few days. These patients usually lose a few pounds of weight the first few days after reduction, but ordinarily regain it within a week or two.

There is usually little difficulty in making a diagnosis of fracture of the mandible, but this is greatly facilitated when there are considerable teeth present, as malocclusion is one of the best clinical signs. Extra-oral skiagrams should always be taken of both sides of the mandible, as frequently with a fracture of the body of the mandible one finds a fracture of the neck of the condoyle on the opposite side.

Union in healthy patients should occur between thirty and forty days and always more promptly when the fragments are brought into proper juxta-position and so retained.

TWO CASES OF HYPERVENTILATION TETANY

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In 1920 Collip and Backus in Canada,[1] and Grant and Goldman[2] in the United States, described the experimental production of a tetany in normal man by prolonged forced breathing. Since that time this type of tetany has been thoroughly studied and there is practically unanimity of agreement that it is associated with an alkalosis, traceable to the excessive lung ventilation and resulting depletion of carbon dioxide from the alveolar air and from the blood. Blood calcium, instead of being below normal as in the tetany of parathyroid deficiency, is either normal or slightly increased.[2, 3, 4, 5]

Such a "hyperventilation" tetany occurring under clinical conditions has been but seldom reported. The few cases in the literature each present their own peculiar features. It seems desirable to report every recognized case until such time as the possible variations in the causative agencies of this particular type of tetany are fully realized.

Barker and Sprunt's case,[6] the first reported, is summarized in its title "A spontaneous attack of tetany during a paroxysm of hyperpnœa in a psycho-neurotic patient convalescent from epidemic encephalitis." Goldman[7] described four cases in which definite manifestations of tetany were present, and two others which showed suggestive symptoms. The increased respiration in these four cases was associated with, respectively, cholelithiasis and cholecystitis, exercise following nausea due to indigestion, a neurosis associated with crying spells, and influenza followed by abdominal symptoms of questionable origin. Goldman also mentions the occurrence of definite symptoms in five college students following a class fight; these students were in poor physical condition. Pagniez, Lerond, and Lebel[8] report a case of tetany following retention of urine, due to irritation, which set up prolonged groaning, following administration of uroformine for a previous gonorrhœa.

In all these cases the actual tetanic manifestations were preceded by a definite and prolonged hyperpnœa. The causes leading to this hyperpnœa varied. With these clinical cases can be perhaps closely compared the experimental production of tetany through hyperpnœa following prolonged immersion in hot baths, as in the experiments reported by Landis, Long, Dunn, Jackson, and Meyer.[9]

In this paper two more clinical cases are reported; the first a patient of Dr. Charles Hunter, Professor of Medicine, and the second a patient of Dr. A. J. Burridge, Associate Professor of Clinical Medicine in this University. To both Dr. Hunter and Dr. Burridge we tender our thanks for permission to publish these records.

CASE 1

Mrs. P., aged 32, was admitted to the Winnipeg General Hospital on January 20, 1928, because of pains in the lower abdomen, "heart attacks," and "weakness and tiredness."

The pertinent features of her history are: slight abdominal discomfort, (worse during menstruation) which commenced in 1917. During her first pregnancy (1921) prolapse of the uterus occurred, which increased after the birth of a normal child, the discomfort bordering on pain. A second childbirth (1923) accentuated both pain and prolapse. A repair operation (1924) afforded partial relief. For six months before admission to hospital indefinite lower abdominal pain, increasing backache, and a "dragging down" feeling in the pelvis, suggested to the patient a recurrence of the prolapse.

The history of tetany probably commenced in September, 1925, with a "heart attack," the first of a series, initially a week apart, but gradually increasing in frequency to one on alternate days. These ceased in February, 1926, but recommenced and ran a similar course from November, 1926, to February, 1927, and again from December, 1927 until admission to hospital. Glycosuria was reported in December, 1925, and the patient was kept on a rigid diet until October, 1927. There is no present evidence of diabetes.

The patient's description of these attacks accords well with subsequent accurate observations. She reported a sensation of "fluttering" of the heart, followed within a few minutes by a numbness of hands, feet, and head, which travelled towards the trunk. Then followed shortness of breath, "gasping," and a few minutes later the hands and feet became stiff. The attack lasted from a few minutes to one and a half hours. It passed off gradually, there remaining an aching pain in the muscles of legs and arms, a feeling of tiredness, and an increase in pelvic pain sometimes severe enough to keep her in bed for two or three days. During the attack she was forced to lie down, though never falling, and never losing consciousness. No involuntary movement of the bowels or bladder occurred. The "attacks" were started by such trivial causes as washing dishes, stooping, climbing stairs, and have even occurred while she was in bed or resting in a chair. Usually no treatment gave relief, although during a severe attack which occurred just before she left for hospital some relief was obtained by administration of chloroform by her local doctor.

Her personal history revealed nothing pertinent.

Condition on admission.—Gynæcological condition (Dr. D. S. Mackay); laceration of perineum with prolapse of uterus; dragging down of ovaries and pelvic congestion. No other positive findings.

Urine analysis: on admission, cloudy, acid, sp. gr. 1,018; a very faint trace of albumen; sugar absent; a few pus and epithelial cells present. A very similar report two days later. A microscopical blood examination revealed nothing abnormal. The basal metabolic rate was +4 per cent.

Hospital History.—On the third day in hospital (January 23rd) the patient had a mild attack of tetany, witnessed and accurately described by a nurse. It lasted between 10 and 15 minutes. Examination shortly afterwards showed a positive Chvostek's sign on the right side, and Trousseau's sign was positive with both arms within two minutes, although Poole's phenomenon could not be elicited. Blood was taken six hours after this attack. The serum calcium was 9.5 mg. per 100 c.c.

On January 25th she slept well till 4 a.m., wakened with a frontal headache not severe enough to disturb her, had her usual breakfast at 8 a.m., and felt fairly well. At 9 a.m., while sitting in a chair waiting for her bed to be made, the usual preliminary symptoms of her attacks commenced, she was helped back to bed at 9.05, and numbness of the hands, wrists, and lower extremities half way to the knee began, followed rapidly by stiffness of hands and legs. Drs. Hunter and Monteith watched this attack from 9.15 a.m. till it ceased at 9.25.

She was conscious and quite emotional. Her breathing was very deep and gasping throughout; at first forty per minute, it increased within three minutes to sixty per minute. (The emotion and the breathing could be controlled by getting her to answer questions, which led Dr. Hunter to the opinion that the attack could have been shortened, or at least controlled, by strong mental suggestion.) The heart rate was 80 to 90 throughout the attack.

The "accoucheur hand" was present, the feet were dorsi-flexed, and the knees extended, with slight rigidity. At the height of the attack the head was drawn back and the face assumed a typical tetanoid appearance. The numbness disappeared with the attack itself, though the hands maintained a tendency to unnatural stiffness and position for the following half-hour.

Chvostek's sign was markedly present throughout the attack (all branches of the facial nerve showed hyperexcitability); it could be elicited for the following twenty-four hours. Subsequently it was uncertain. Trousseau's phenomenon was markedly present throughout the day, and definite all the succeeding day. Poole's arm phenomenon was questionable; the leg phenomenon could not at any time be elicited.

Blood taken at the height of this attack had a serum-calcium value of 10.1 mg. per 100 c.c.

The patient stated that this was a mild attack. A few days later she had a very mild attack, not seen by a doctor. It passed off quickly. Trousseau's sign could be elicited afterwards, but the Chvostek sign was uncertain.

On February 4th, Dr. D. S. Mackay operated, repairing the pelvic floor. The anæsthetic was taken extremely well and she made an uninterrupted and uneventful recovery. During this recovery period she experienced the preliminary phases of these attacks but they were easily controlled. Dr. Hunter stopped one attack immediately by using mental suggestion. The nature of the attack was explained to her, and she was told that she could prevent it herself by controlling her breathing. She then found that whenever the preliminary "fluttering" of the heart became noticeable she could prevent any subsequent development by deliberate breathing control.

She was discharged from hospital on February 29th. At this time a 24-hour specimen of urine showed no trace of albumen.

In the last week of March there was some recurrence of abdominal pain, with the initial symptoms of tetany, coincident with onset of the menses. By control of her breathing she has been able to prevent these attacks reaching the stage of stiffening of the extremities, and although when she was last heard from (May) the attacks still recurred from time to time, she appears to be gaining increased control of them.

CASE 2

Mr. K., Hebrew, aged 28, was admitted to the Winnipeg General Hospital on May 17, 1928, for examination.

History.—For several months he had experienced a feeling of fullness after meals, flatulence, and an inability to digest a fatty diet. On April 4th last, while driving his car, he felt a sharp needle-like pain in the epigastrium, which travelled upwards. He then had difficulty in breathing, deep rapid respiration set in, and this was followed within a few minutes by stiffening of the hands and feet, these extremities, from his description, behaving as in a typical tetanic spasm, while his face became contracted towards the right. The attack lasted between five and ten minutes; then the pain ceased, next the breathing became normal, and finally the spasm ended.

After ten days precisely similar attacks occurred,

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and he was averaging about one a day when admitted to hospital. For two days before admission he had a steady dull pain in the epigastric region. During this period he saw Dr. Burridge, who sent him to hospital for examination.

Hospital history.—The essential features, from the standpoint of this paper, were as follows: Two or three typical attacks occurred during his stay in hospital. During the first, studied closely by one of us, he exhibited the "accoucheur hand," feet dorsiflexed, positive Trousseau and Chvostek signs, and presence of Poole's phenomenon (both arms and legs), while *a sample of blood taken during the height of the attack gave a value for serum-calcium of 11.3 mg. per 100 c.c.* The attacks were all preceded by pain, and immediately preceded by rapid deep breathing. They usually lasted ten minutes or less.

General examination was negative. A barium series gave negative results. A gall-bladder test (Graham's method) gave faint visualization in sixteen hours. From the previous history of digestive disturbance and the gall-bladder visualization test, together with the above study of an attack, Dr. Burridge made a tentative diagnosis of cholecystitis, complicated by hyperventilation tetany.

It was explained to the patient that the tetany could be prevented by control of breathing. He was discharged from hospital on May 26th.

DISCUSSION

The first case is that of a tetany following lung hyperventilation arising from the continued discomfort of the pelvic condition, accentuated by various minor factors.

The second case is that of a tetany following lung hyperventilation set up by pain, probably due to cholecystitis, and thus resembling one of the cases reported by Goldman.

Education of the patient as to the cause of the attack, and the possibility of arresting it by control of breathing, seems indicated as a satisfactory form of treatment.

Although tetany following lung hyperventilation has been so rarely reported in the literature, yet, especially since several of the cases actually reported have been only single transient attacks, it seems just possible that a more careful watch for them may indicate that tetanic attacks of this type (especially slight ones) may be in reality not so uncommon.

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A FATAL CASE OF MUMPS

BY G. G. LECKIE, M.D.

Lucky Lake, Sask.

The following case is reported chiefly as a warning to any who may be inclined to treat parotitis of the epidemic variety as a disease void of any danger.

An epidemic of parotitis prevailed at the time; practically all susceptible children in the neighbourhood were attacked, yet they did not complain except for one or two days at the commencement of the infection, and would not remain in bed longer.

CASE REPORT

A farmer, aged 42, in the best of health previously; he had never been ill except with children's diseases.

He was first seen on January 10th, when he had a slight unilateral swelling, with fever, and malaise. A diagnosis of mumps was made.

On the 21st he was seen again, and then complained of weakness of the arms and legs. He said he had remained indoors since I had seen him, except the day before, when he had gone only as far as his barn, but had to return because he felt weak. On returning to the house he could not raise his arm to hang his coat or hat on a peg, and was helped to the bedside.

On examination, the swelling which he said had been very marked, extending down his neck and even over the clavicle on the one side, had not entirely subsided. The temperature was normal; pulse rate, normal; knee-jerks, sluggish; the plantar reflex, not elicited; the abdominal reflex, present; arm reflexes could not be elicited.

The following day he was no better.

On the 23rd I again examined him. Now he could not raise his legs or arms at all, yet he could move his fingers and hands freely. He lay quite helpless. Knee-jerks, absent; Babinski reflex, present; abdominal reflex, absent; temperature and pulse, normal.

On the 24th, he was as above, but complained of dryness of the tongue and throat, slight difficulty in articulation, and had dysphagia and dyspnœa.

The same day, eight hours later, he could speak only in a whisper. His breathing was thoracic entirely, with increasing cyanosis. Finally, artificial respiration revived him for

two hours, when he died of asphyxiation, conscious until artificial respiration ceased.

The diagnosis of acute ascending paralysis, complicating mumps, was made.

LYMPHOID LEUKÆMIA AND TUBERCULOSIS*

BY J. FEIGENBAUM, M.D.,

Montreal

A rather unusual case of lymphoid leukæmia with several interesting features was recently observed on the Medical Service of the University of Michigan Hospital. The following is an excerpt of the history, physical examination, laboratory and necropsy findings:

G. E. J., (No. 185483), male, aged 56, labourer, was admitted to the hospital on December 24th, 1927, complaining of "lumps in the neck," a failing appetite, loss of weight, weakness, and pains in the abdomen. The patient dated the onset of this illness one year ago, December, 1926, when he noted two lumps in the upper part of the neck. Three months later, similar masses appeared in the various lymphadenoid situations of the neck. These masses were at first painless and hard, but subsequently, certain of them softened and ultimately broke down, discharging a thick creamy material. A thin discharge then continued for one to two weeks, when the opening in the skin closed. This was not invariably the course of events, however, and a sinus with its mouth over the episternal notch had oozed intermittently for six months. Weakness was so marked for six months that it entirely incapacitated the patient. Emaciation was progressive and a loss of fifty pounds in weight had occurred. On July 1, 1927, the patient was seized with severe, colicky pain in the abdomen, which subsided after a few days, but returned about the middle of December 1927, to recur persistently after taking solid food or fluids. Associated with this pain there was diarrhœa. During an interval of four weeks, in the summer of 1927, deep jaundice was present. For one month before admission the patient suffered from a moderately productive cough, with hoarseness. Weakness had been marked for six months, and anorexia had been present ever since the beginning of the patient's illness. Dysuria occurred on several occasions during the period of ill health.

Physical Examination.—On admission the patient showed a temperature of 99.4 degrees F., a pulse rate of 104 per minute, and respirations 28 per minute. A hypotension of 90/50 was present. Emaciation was pronounced, and the patient appeared acutely ill when he was first observed. There was a well marked arcus senilis. The lips were pale, the tongue, buccal mucous membrane, and the palate were abnormally dry. The tonsils were moderately enlarged. The neck presented the most puzzling findings of the whole physical examination. An elongated swelling was visible along the anterior border of the left sterno-mastoid, and a round mass about the size of a walnut above the sternal end of the right clavicle. Fluctuation was obtained over both of these. Two scars, evidence of old sinuses, were present on the left side of the neck while at the right base of the neck there was an open, ulcerating, indurated and painful surface, about the size of a quarter. The posterior cervical lymph-nodes on both sides of the neck were as large as marbles. They were tender, matted together, and adherent to the subcutaneous tissues, though the skin over the nodes was perfectly free. The right axillary as well as the epitrochlear and inguinal lymph-nodes on both sides were slightly enlarged. Over the right supraspinous fossa an impaired percussion note was obtained, with accentuated breath sounds over this area and over the first right interspace and interscapular regions. The heart sounds were distant. The abdomen was distended, and diffuse tenderness made palpation unsatisfactory. Rectal examination was extremely painful, but revealed no further abnormalities. Cyanosis of the nail-beds was well-marked.

Laboratory Examinations.—The urine showed a very faint trace of albumen. A negative blood Wassermann reaction was obtained. The blood picture revealed: red blood cells, 4,060,000 per c.mm.; white blood cells, 89,400 per c.mm.; and hæmoglobin 42 per cent (Sahli). White blood cell counts of 64,500, 105,500, and 85,800 per c.mm. were obtained on three subsequent occasions. The differential blood count was interesting; polymorphonuclear neutrophiles 2 per cent, small lymphocytes 4 per cent, large lymphocytes 3 per cent, and monocytes 91 per cent. The red blood cells were pale, round, and they showed marked anisocytosis (Fig. 1). A few normoblasts were found. Some phagocytic monocytes were noted in the blood film, and several hæmohistioblasts of the monocyte or lymphocyte series. An examination of the stool showed a faint trace of occult blood. Aspiration and culture of the fluid from the cystic swelling over the sternal end of the right clavicle yielded a growth of *S. aureus*. This was probably the result of a contamination, because a later culture from the same source remained sterile. The blood non-protein nitrogen content was 58.4 mgm. per cent. A roentgenogram of the chest revealed several Ghon's tubercles in the left lower lung field.

Course in the Hospital.—The patient's condition on admission was very poor, and became progressively worse during the few remaining days of his life. He was very uncooperative, and during the last three or four days delirium supervened. There was a troublesome diarrhœa for one week preceding death. The temperature during observation ranged between 97 and 100 degrees. On January 2, 1928, signs of consolidation became evident over the right lower lobe of the lungs. The patient then lapsed into coma, and died a few hours after this.

Autopsy.—(2589. A-122-AF.) The external examination as recorded in the autopsy protocol did not disclose anything not already given under physical examination.

The spinal cord, brain and meninges showed no abnormalities. Old calcareous foci were present in the left upper lobe of the lungs, with adhesions about the apex of the right lung and caseous tubercles in the lymph nodes at the hilum. There was a marked hypostatic congestion of the right lower lobe of the lungs, probably terminal. A complete synechia cordis was found, while the heart itself showed no striking changes. The thickened omentum presented many nodules varying in size from a pin-point to a pea, and was adherent to coils of small intestine. The edge of the liver extended 16 cm. below the ensiform cartilage; the spleen was slightly enlarged. Tubercles studded the peritoneum, the spleen, and the intestines. The mucous membrane of the transverse colon showed ulcerations in its circular axis. Two small ulcers, one-half centimetre in diameter, were present in the duodenum; one, just beyond the pyloric ring, and the other, four cm. below the pylorus. On the lesser curvature of the stomach there were two ulcers, penetrating through the wall of the stomach, and leading into a large mass of pancreatic tissue behind. The peri-pancreatic lymph nodes were enlarged, and several were soft and necrotic. The mesenteric lymph nodes were also enlarged and contained tubercles and small abscesses. An occasional tubercle was seen on the surface of the liver. The bone-marrow was soft and light red in colour.

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Microscopically, leukæmic clots were visible in all the blood vessels. The spleen showed leukæmic metaplasia, with numerous large caseating tubercles. The mucosa, submucosa and subserosa of the entire alimentary tract had become involved in the leukæmic process. Sections showed this to be the case also in the omentum, pancreas, liver, gall bladder, adrenals, kidneys and urinary bladder. A marked chronic interstitial inflammation was observed in the pancreas, with non-tuberculous sinus tracts traversing that organ. Tubercles were demonstrated in the liver, kidneys, and retroperitoneal lymph glands, while the mouth of the sinus in the neck showed tubercles in pyogenic granulation tissue. The bone-marrow had undergone lympho blastomatous metaplasia.

COMMENT

As has been seen, this case presents many unusual findings both from the clinical and the pathological side. The striking fact is, of course, the association of a leukæmia with widespread tuberculosis. The co-existence of the two diseases has been recognized for a long time, and has been noted by various authors. Thus Osler[1] in his text-book says that tuberculosis is not an uncommon complication of leukæmia, and cites Dock,[2] who collected twenty-seven cases from the literature. Many of our observers, however, stress the frequent occurrence of tuberculosis in myeloid leukæmia, but fail to mention its incidence in lymphoid leukæmia. Karl Vogel,[3] in his discussion of the complications which are met with in the leukæmias, intimates that tuberculosis is frequently present in the myeloid variety, but passes over its occurrence in the lymphoid type. Nanta[4] has gathered thirty-seven cases from the literature and added observations from one of his own cases, in whom both myeloid leukæmia and tuberculosis were present. Only passing reference is made in this review to the association of lymphoid leukæmia and tuberculosis. Ordway and Gorham,[5] while pointing out the etiological relationship which is supposed by some to exist between these two diseases, dismiss the subject by stating that "the actual co-existence of tuberculosis and leukæmia is rare." Richard Cabot[6] maintains that tuberculosis is not uncommon as a complicating factor in lymphatic leukæmia. R. R. Dieterle,[7] in 1916, reported a case from the pathological department of this clinic which bears a remarkable similarity to the one recorded above. The autopsy brief of Dieterle's case states in part "chronic lymphatic (mixed lymphoid myelogenous) leukæmia; primary tuberculosis of the cervical glands; acute miliary tuberculosis of all organs, including the skin; multiple lymphomata of kidneys and liver; leukæmic infiltrations of the gall bladder and intestine." P. Emile-Weil and Coste[8] cite a case in a male of 26, whose chief complaints were fever, cervical adenopathy, and a tendency to hæmorrhage. This man's white blood cell count was 54,000 on admission, but rose later to 90,000. At the onset, the whole picture was that of a myeloid leukæmia, but later it assumed the form of a lymphoid leukæmia. From their description, however, the myeloid leukæmia probably developed into the myeloblastic type, which is often confused with lymphatic leukæmia. Lymphomatous infiltration of the hæmatopoietic organs with miliary tuberculosis was disclosed at the post-mortem examination.

The blood smear in the present instance offered material for an interesting study. As will be remembered, the majority of the white blood cells were of the mononuclear variety (91 per cent). Many of these were large cells having circular deeply staining nuclei and a lighter staining cytoplasm, with numerous small basophilic granules sprinkled throughout. Such cells have been classified in the lymphatic series and have been seen in cases of acute lymphoid leukæmia.[9] This lends some support to the impression that the patient, when seen here, was suffering from an acute exacerbation of a chronic lymphoid leukæmia. The majority of the mononuclear cells were of a different variety and consisted almost entirely of large nuclei, usually notched, with chromatin more deeply staining than that seen in mature lymphocytes. A tiny segment of cytoplasm opposed to the nuclear indentation completed the morphology of these cells. Lymphoblasts are larger cells and have a more abundant cytoplasm. It is obvious that the blood picture *per se* was not entirely characteristic of lymphoid leukæmia. Landon[10] believes that a diagnosis of lymphoid leukæmia should be made only with caution in the presence of a mononucleosis even with a marked leukocytosis. He reports two cases in confirmation of this view; in one the diagnosis proved to be infectious mononucleosis, and in the other an acute form of pulmonary tuberculosis.

Another feature of interest is the presence of a virulent form of tuberculosis in the presence of an excess of lymphocytes—the type of cell

which is usually associated with immunity in tuberculosis. It is suggestive that the so-called lymphocyte of lymphatic leukæmia is not identical with the normal lymphocyte of the circulatory blood, but bears the same relation to it as does the cancer of the breast cell to a normal cell in the breast tissue.

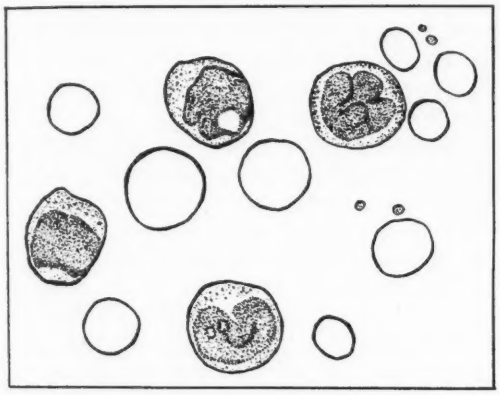

FIG. 1.—Oil immersion field of blood film showing atypical monocytes. The red blood cells show definite anisocytosis. (Camera lucida drawing).

The diagnosis in this case was obscured considerably by the necrosis which had occurred in the lymph nodes of the neck. So far as could be ascertained, there is no reference in the literature to breaking down nodes in lymphatic leukæmia. Indeed, the sinus tract in the neck, together with the sterile culture obtained from the necrotic mass, suggested rather strongly a tuberculous process in the lymph nodes.

The multiple non-tuberculous ulcerations met with in the stomach, duodenum, and colon presented another problem for explanation. It is probable that these ulcers did not exist prior to the patient's final illness, as there was no history of gastro-intestinal disturbance before his illness. While gastric and duodenal ulcers may be symptomless, ulcers of the colon seldom are. It is very likely, then, that the defects in the mucous membrane observed at autopsy followed the leukæmia. As has been seen, the widespread lymphoid infiltration did not spare the mucous membrane of the gastro-intestinal tract, and it is quite possible that the chemical and mechanical irritation of the digestive juices and food succeeded in producing death in tissues which had become *loci minoris resistentiæ* (infiltrated with lymphoid cells).

The reason for tuberculosis following upon a leukæmia seems obvious. The ability of the body to cope with infection is reduced by a chronic illness, leukæmia. Tubercle bacilli which have been encapsulated and dormant for years become active, and a dissemination of the bacilli produces miliary tuberculosis. It is interesting to note that at one time this case might have been cited as proof for the tuberculous etiology of the leukæmias, in spite of the distinct microscopic pictures produced by each disease.

SUMMARY

1. A case is reported of lymphoid leukæmia co-existing with tuberculosis.

2. Attention is drawn to the few references of this combination of diseases in the literature.

3. The atypical blood picture in this case, together with certain clinical features, suggested two diseases rather than one.

4. The lymph node of lymphatic leukæmia apparently never breaks down, unless secondary infection has taken place in it.

5. The occurrence of tuberculosis in lymphatic leukæmia can best be explained by regarding the tuberculous process as an expression of lowered resistance in the patient.

My thanks are due to the pathological department for permission to make use of the autopsy record, and to Drs. C. C. Sturgis, H. Field, and R. Isaacs for their kindly advice.

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Editorial

THE ANNUAL MEETING AT CHARLOTTETOWN

THE Canadian Medical Association held its annual meeting this year at Charlottetown, P. E. I. This was the 59th annual convention since its foundation in 1867, but it was the first time the Association had come to "The Island." If, however, the success of this meeting is to be a sufficient precedent, this site has gained a permanent place in the list of those to be considered in other years.

What makes for the success of such gatherings? The place of meeting may have peculiar attractions of its own; there may be large numbers in attendance; the occasion may be marked by the announcement of great developments in medicine. But one cannot expect all these conditions, nor would it be anything but an unnecessary and invidious task to try to apportion them to each occasion. What, above all, must preside at a meeting of this sort is the spirit of hospitality, and how strongly it was in evidence at the Charlottetown meeting will not readily be forgotten, especially by those seeing Prince Edward Island for the first time. The natural beauty of the island, the excellence of the program, the evident enthusiasm of those in attendance, all contributed to a sense of success, but one's memory will longest retain the warmth of welcome and the continual entertainment which was so whole-heartedly offered by what seemed to be the entire population.

Those who planned this meeting could not have had a happier inspiration than that of chartering a steamer for those from Quebec and western points. The S.S. "New Northland" carried but a small proportion, it is true, of those attending the convention, but they were representatives of every province from Quebec to the Pacific Coast, and before the cementing influence of the convention itself began, the association on board had gone far in the establishment of cordial friendships and understandings. In Charlottetown, too, the boat became a centre of interest and entertainment, enabling the ladies of the party to return in some degree the hospitality shown them in such good measure by the hosts and hostesses of the Island. In future, no convention should be considered complete without some such introductory boat trip!

Two full days were taken up with meetings of the Council, and the volume of business transacted might easily have encroached on even more time if the chairman had been one of less experience and firmness. In this Parliament of the Association there is much to be learned, and not least the principle of consideration for the opinions of all its diverse members. There can be few other medical Associations whose various parts possess such varying characteristics and problems as the provincial daughter societies of the Canadian Medical Association. There certainly can be no other Association in which these minor differences are more successfully harmonized. How wise a suggestion it was that henceforth one or more of the most recent graduates should each year be appointed to sit on the Council to follow its deliberations. The work of the Association itself is naturally of a specialized order, and demands men trained in administration, but no better demonstration of its functions could be given, and in no quarter where it would be more effective, than by some such plan as that mentioned.

One must be impressed by the variety of objects in which the Association is interested, and by the progress attending all that it takes up. What does the future hold for it? Judging by the confidence and zeal of its members, only the best things, those most nearly approaching its ideals. But that cannot be all. Full of vigour and promise as the Association is, it still will meet its difficulties and troubles. This thought was well expressed by one member,* who saw in this particular meeting something of a pause for the gathering of new strength.

* Dr. G. H. Murphy.

It was as if the Association, with all its achievements behind it, and its hopes and plans before it, had withdrawn to one of the most quietly beautiful parts of Canada, not attempting to bring together great numbers, nor to celebrate any special scientific advance, but chiefly to regain that impetus which its work will demand of it in steadily increasing measure. Is there any other place in Canada from whose historical associations there could be derived a keener stimulus to unity and high purpose?

PUERPERAL SEPSIS

WE are publishing in this issue an abstract of an address by Dr. James Young, of the Edinburgh Royal Maternity Hospital, delivered before the Edinburgh Obstetrical Society, on Maternal Mortality from Puerperal Sepsis; a subject which is engaging much thought in the profession both in Great Britain and in America, and deservedly so. In Canada attention has been called to the unnecessarily high mortality connected with maternity practice, especially in the outlying districts of our several provinces, and the statistics elicited by the recent questionnaire of Dr. Helen MacMurchy present an urgent problem to our profession.

In Great Britain, the Council of the British Medical Association, recognizing the need for investigation, appointed in 1924 a special committee to enquire into the causation of the high puerperal morbidity and mortality. In its report this Committee calls attention to many possible factors of which our knowledge is defective and on which experimental research is necessary. Undoubtedly, all hospital records point out the increased evidence of morbidity which arises from unnecessary intervention, and to the fact that the morbidity risk increases the higher up in the genital tract the manipulation extends. In an editorial on this subject, the *British Medical Journal* makes the suggestion that while an increase may have taken place in the number of skeletal defects in mothers, resulting from the survival of many rachitic children who, owing to imperfect care, would have succumbed in the past, nevertheless, the important change which has taken place in the child-bearing women of to-day is the peremptory call for the relief of pain and the shortening of the period of travail by means of anæsthetic drugs and the forceps. Medical attendants are chosen largely from those who will afford this relief, and accoucheurs have to steer the difficult course between the strongly expressed desires of their patients, associated with the urgent demands of other branches of work, and what they may recognize as the safe course to take.

Dr. Young in his address insists on the need of educating the public to the realization that at the present a price must be paid for the relief which the parturient mother in so many instances imperiously demands, and pleads for the importance of securing, so far as may be, practicable natural delivery. The statistics he presents are worthy of careful thought by the profession, and the suggestion of team work between doctor and trained midwife would appear in many respects to be a valuable one.

The preliminary report by Dr. Burt White of his investigations on the varying resistance of puerperal women to streptococcal vaccine appears to indicate that those who react to this toxin are more liable to puerperal fever than those who do not,—an interesting fact which may prove valuable. His experiments may be briefly summarized as follows: In an investigation of 100 pregnant women 27 proved sensitive to a dose of scarlatinal toxin, 1.5 c.cm. of a dilution of 1 in 1,000 strength. Eight, or 30 per cent, of these sensitive women experienced a morbid puerperium, though labour was altogether normal. Seventy-three gave no reaction; of these, two had a morbid puerperium, but in neither of them could streptococci be found in the cervix or in the blood. Thirteen of these non-reacting women sustained difficult labour but had a satisfactory puerperium, and in no instance did the bacteriological examination reveal the presence of *streptococcus pyogenes*.

His inference was that women who react positively to intradermal inoculation of scarlatinal toxin are more liable to develop puerperal sepsis than those who do not react. The comment in the editorial in the *British Medical Journal* is to the effect that, once knowledge of this kind has been definitely established, and it becomes possible not only to pick out those in whom the power of resistance is low but in the prenatal period to raise the resistance, the risks of artificial aid may be greatly lessened.

ALEXANDER GORDON OF ABERDEEN

IN connection with the above we note the very charming reference to the brochure by Alexander Gordon of Aberdeen, entitled "A Treatise on Epidemic Puerperal Fever in Aberdeen," published in 1795, which appears in the *American Journal of Obstetrics and Gynecology*, February, 1928, from the pen of Herbert Thoms, of New Haven, Connecticut.

Alexander Gordon was born in 1752, took his degree of M.A. at Marischal College, Aberdeen, and began the study of medicine first at Aberdeen Infirmary, but later on in Edinburgh. He joined the navy as surgeon's mate in 1780, and two years later obtained the rank of surgeon. In 1785 he retired on half pay and came to London, where he became a resident pupil at a lying-in hospital, and attended lectures on midwifery by Denman and by Osborn. He afterwards attended lectures at Westminster Hospital. After this training he returned to Aberdeen and obtained his degree of M.D. Shortly after, he was appointed physician to the dispensary, and obtained an excellent reputation and a large practice in which he devoted himself chiefly to obstetrics. Four years before his death he was again summoned by the Admiralty for active service in the Navy, but speedily developed tuberculosis and was invalided home. His death took place in 1779 when he was forty-seven years of age. The *British Medical Journal*, June 9, refers to Dr. Thoms' article as follows:—

"Dr. Thoms cordially agrees with A. W. W. Lea, who maintained that Gordon was to be credited with having first clearly demonstrated the infectious nature of puerperal fever. Oliver Wendell Holmes was so much impressed with Gordon's treatise that in his essay he quoted the following paragraph in capital letters: "By observation I plainly perceived the channel by which it was propagated, and I arrived at that certainty in the matter that I could venture to foretell what women would be affected with the disease, upon learning by what midwife they were to be delivered or by what nurse they were to be attended during their lying-in, and almost in every instance my prediction was verified." With extraordinary honesty Gordon continues: "It is a disagreeable declaration for me to mention that I myself was the means of carrying the infection to a great number of women." In another important passage he shows the analogy between puerperal fever and erysipelas, in both of which the infectious matter is readily absorbed by the lymphatics in the vicinity of the wound. Gordon not only demonstrated the infectiousness of puerperal fever, but had a definite idea of the pathology of the condition, whereas his contemporaries Hulme and Lake pronounced the omentum to be the seat of the disease. Gordon by his dissections showed that puerperal fever was a disease which principally affected the peritoneum and the ovaries. Lastly, he laid down the following rules for prophylaxis: "The patient's apparel and bedclothes ought either to be burnt or thoroughly purified, and the nurse and physicians who had attended patients affected with puerperal fever ought carefully to wash themselves and get their apparel properly fumigated before it is put on again."

BRUCELLA FEVER

THE publication in this issue of the *Journal* of a paper by Drs. Scozzafave and Warner, of Welland, Ontario, on the subject of Brucella abortus infection in man, should serve to focus the attention of the Canadian medical profession on a new, and what promises to be a serious, public health problem.

The microorganism, known as *Brucella abortus* is the cause of contagious abortion in cattle, and is closely related to, if not identical with, *Brucella melitensis*, the specific cause of Malta fever. It is generally known that Malta fever, found originally in goats, is communicable to man, and it has been suspected for some time that Brucella abortus might, on occasion, be pathogenic for man also. Convincing evidence in favour of the latter possibility, however, was not obtained until 1924 when Keefer described a case, which he called Malta fever, but in which an organism conforming exactly to the type of Brucella abortus was isolated (*Bull. Johns Hopk. Hosp.*, 1924, xxxv, 6).

The specific cause of Malta fever, also called Mediterranean fever and undulant fever, was discovered by Sir David Bruce in 1887. The disease is constantly to be found in countries bordering on the Mediterranean Sea and in the districts adjoining. It was apparently introduced into the United States about twenty-five years ago. The first case was recorded by Craig (*International Clinics*, Phila., 1905, xxii, 576).

Evidence is accumulating to indicate that Malta fever is gradually gaining a secure foothold in the country. The extent of the menace, however, can hardly be estimated at the present time, or until medical men generally become alert to its presence.

The work of Evans (*J. Infec. Dis.*, 1918, xxii, 576) shows that *Brucella melitensis* and *Brucella abortus* cannot be distinguished culturally or morphologically. Even the most refined serological tests can hardly make a distinction. These conclusions have been confirmed by several later workers.

Infections with organisms of the genus Brucella occur in goats, cattle, horses, pigs, and human beings. Little is yet known as to the extent of these infections and the modes of transmission.

In so far as man is concerned, the clinical features of Malta fever and infection with Brucella abortus are so similar as to be indistinguishable. This is to be expected in view of the close relationship and probable identity of the two micro-organisms. In view of these facts the suggestion of Drs. Scozzafave and Warner that the term Brucella abortus infection should be applied in the future to this disease is worth considering. But why not the simpler "Brucella fever"?

It is a matter of prime importance that the general practitioner, especially, when he meets with an obscure case of continued fever, that is not typhoid or paratyphoid, should think of Malta fever or infection with Brucella abortus. At present the diagnosis must be made by laboratory methods. It is not enough that a Widal test be done in cases of this character, but further tests should be carried out with the indicted strains of Brucella. This procedure, carried out as a routine, would likely do much to clear up a somewhat hazy situation. Something more would be learned in regard to the relationship existing between *Brucella melitensis* and *Brucella abortus*, their relative distribution, and the extent of their invasion. Much more, too might be learned about the clinical symptomatology and the sources of infection. Up to the present time only severe cases have been studied; probably many mild cases have gone undiagnosed.

Should it be found that Malta fever and Brucella abortus infection are prevalent in Canada, it should be a relatively easy matter, by a study of these diseases in goats and cattle, and possibly in other of the domestic animals, to locate the source of the trouble and the manner of its spread, and to deal with the problem intelligently and effectively.

THE CENTENARY OF THE SYNTHESIS OF UREA

IN 1828, just one hundred years ago, an achievement in chemistry revolutionized the outlook of chemists and initiated the development of organic synthesis, which, since then, has resulted in the production in the laboratory and the chemical factory, of more than eighty thousand "organic" compounds. This achievement was the preparation of urea in the laboratory from ammonia and cyanic acid by Friedrich Wöhler, then twenty-eight years of age, a graduate in Medicine of Heidelberg (1823), and a pupil of Gmelin, the Professor of Chemistry there, who influenced him to devote his life to chemistry.

Wöhler, in a research on cyanic acid and salts of this acid, endeavoured to prepare ammonium cyanate by bringing together ammonia and cyanic acid, which theoretically should form ammonium cyanate but yielded urea instead. That ammonium cyanate is first formed he found out in 1829 but it is quickly transformed to urea.

To recognize the importance of this achievement one must understand the viewpoint of the chemists of that time. It was then the universally accepted belief that living matter alone, whether in the form of cells, tissues or organs, in the animal and vegetable kingdom, had the power to form the compounds or substances that they yield. It was held that in such living matter a vital force, principle, or power, was concerned, which directed the activities of the cells in the formation of the compounds, "organic" as they were then consequently called, peculiar and distinctive of the structures in which they were produced. This vital force. it was believed, had no peer in the laboratory, even of the consummately trained chemist who, therefore, could make only those compounds in the production of which the vital force played no part. Such compounds were consequently termed "inorganic."

Of organic compounds there were then isolated comparatively few. Amongst these were urea and uric acid found in urine, starch, sugars, alcohols, fats, fatty acids, glycerol, certain hydrocarbons and indigo. Of the proteins none were as yet isolated separately and they were collectively known as albumens, from the Latin name of the white of egg, or in German, *Eiweissstoffe* (egg-white substances). The first attempt to isolate them was made in 1846 by the Dutch chemist Mulder, who coined the word "protein" to designate the fundamental substance in the white of egg, which he claimed he had prepared in a pure state.

The synthesis of urea by Wöhler caused a great sensation amongst the chemists of that time. Some of his colleagues said: "Wöhler went out to find an ass, but found a kingdom," alluding to the Biblical story of King Saul. Berzelius, the then greatest chemist, declared he had won an immortal name. The vitalists, the exponents of the doctrine of the vital force, were not long silenced. They claimed that urea is a waste product of the living cells, and, therefore, it stands halfway between the organic and the inorganic compounds. The synthesis of urea was admitted, but further than this the synthesis of organic compounds would never go. It did not at once, but in 1845 Kolbe, one of Wöhler's students, made acetic acid synthetically; and hippuric acid, the constitution of which was determined by Liebig in 1839, was synthesized by Dessaigne in 1857. In 1856 William Henry Perkin, then a chemist, eighteen years of age, prepared artificially "mauve," the first coal-tar colour, or aniline dye, and now thousands of such dyes are produced. Indigo, once wholly derived from an Indian plant is now made in tons annually. Emil Fischer has synthesized a number of hexose sugars. Many of the fatty acids and neutral fats have been prepared synthetically; polypeptides, near neighbours of the peptones, have been made and from peptones proteins have recently been formed. Adrenalin, a product of the suprarenal glands, has been synthesized and thyroxin, the distinctive iodine compound formed by the thyroid gland, is now also a laboratory product.

More conquests will follow, and it is not impossible to believe that in the next one hundred years nearly all the compounds formed in the laboratory of the living cell will be synthesized in the chemist's workshop. The term "organic," still used to designate

them, will always remain to remind us of the exploded theory of vitalism which dominated the minds of chemists, physiologists, biologists, and thinkers before 1828. There are, indeed, vitalists to-day, but they are of quite a different kind. They dwell on mist-enveloped metaphysical elevations from which they send from time to time expressions of their belief that life in the simplest form is not all due to the operations of the forces comprehended in the sciences of physics and chemistry.

The artificial preparation of urea was not the only striking achievement in Wöhler's career. In 1827 he prepared aluminum, which hitherto had not been isolated, by fusion of salts of this element with metallic potassium. Similarly, he isolated beryllium and yttrium. He discovered that when benzoic acid is taken in food it appears as hippuric acid in the urine. Cocaine was obtained by him in crystalline form from extracts of cocoa leaves, and he noted its anæsthetic action on the tongue when it was tasted. A large number of other achievements of equal importance distinguished him in the fifty-eight years (1824-1882) of a life devoted to science. His laboratory in Göttingen was the training centre of thousands of young chemists who went there from all parts of the world.

When we glorify those who have greatly achieved let us remember Wöhler, who not only prepared urea artificially, but also thereby completely altered the outlook of all who give themselves to the study of the products of living matter.

A. B. MACALLUM

RECENT WORK ON VITAMINS

OUR knowledge of vitamins is now reaching the stage at which the essential chemical individuality of these substances can be emphasized and appreciated. Though we still name them alphabetically, a big advance has been made by the characterization of three of them as not merely fat-soluble, but essentially non-nitrogenous and lipoid in nature, and probably allied to the class of complex alcohols known as sterols, whence it has even been suggested that they should be called vita-sterols. Of these, three, A, D, and E, deficiency of which lead respectively to xerophthalmia, rickets, and sterility, we know most, chemically, of D, produced by the action of ultraviolet light upon ergosterol, $C_{27}H_{41}OH$, in forming a resin. Whether the resin be D or a mixture, and what is the true nature of D, are points still to be elicited. The claim of certain Japanese investigators to have obtained pure vitamin A (their "biostearin") cannot be upheld, but it cannot be long before A is isolated, and it is almost certainly, as Drummond has shown, a complex unsaturated alcohol. Within a very short period cod liver oil will not be the necessary and desirable source of A and D; instead, synthetic and tasteless preparations will be available. Vitamin E is an oil, and contains no nitrogen.

While little recent advance has been made towards determining the chemical nature of the anti-scorbutic vitamin C, steps forward have been taken in work on the anti-beri-beri vitamin B, since it has been shown conclusively that this "preparation" contains two vitamins one of which is a growth-factor (perhaps identical with the vitamin associated with protein which prevents pellagra), while the second is the essential preventive of beri-beri and avian polyneuritis, and is not concerned with growth. Evans and Burr have recently shown that "tikitiki," a dilute alcoholic extract of white rice polishings made by the Philippine Bureau of Science to combat beri-beri amongst the natives of those islands, contains practically none of the growth-promoting factor, which is present, however, in both commercial cornstarch and commercial casein.

There remains *bios*, shown long ago by Wilders to be essential to the growth of the yeast plant. An attempt has been made by some writers to deny to bios the privileges of a vitamin, since apparently, while it may be necessary for plants—at any rate for yeast—it does not seem necessary for animals. Such an attempt to differentiate between the chemical processes of plants and animals is unwise, and tends to retard rather than

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promote progress. In any case, one of the constituents of bios is almost certainly necessary for the animal organism. According to Kerr, bios can be resolved into three fractions, each necessary to the growth of yeast. One is a crystalline compound having the formula $C_5H_{11}NO_3$; the second, apparently a basic substance, is probably a derivative of indol and so related to the amino-acid tryptophane; and the third is Lash Miller's bios.

Professor Lash Miller, of the University of Toronto, and his co-workers, after prolonged study, have just made the important discovery that this fraction, which he had previously termed Bios I, is *inositol*. Inositol $C_6H_6(OH)_6$ is a derivative of benzene, in which to each of the carbon atoms of the benzene ring is joined an atom of hydrogen and a hydroxyl radical. It appears to be necessary not only to the plant, but also to animals. Its importance is only slowly becoming recognized. In plants it occurs free, and also united with phosphoric acid, calcium and magnesium, as the compound phytin. Plants contain a special ferment, phytase, which splits phytin into its components.

Inositol is present in traces in our muscles and other tissues, and in urine. While for long it was thought that this was merely accidental, due to the ingestion of plants containing it, recently Needham has shown that it is actually formed from glucose by the developing egg-embryo, from which fact there is a reasonable assumption that it has a definite function in the animal.

It is probable that the complete list of vitamins is not yet known, but we are coming to full realization of the importance of these compounds, minute amounts of which, in collaboration with similarly minute amounts of the endocrine secretions and the ferments of the body, control so delicately its vast and complex chemical mechanism. Yet we have still to learn the most important facts about them. What are the functions of these vitamins in the normal living organism? How do they act?

A. T. CAMERON

Editorial Comments

A SECTION OF HISTORICAL MEDICINE IN THE CANADIAN MEDICAL ASSOCIATION

The arrangement of subjects in "Sections" is a convenient plan for dealing with specialized knowledge, and may sometimes even be looked upon as marking a kind of coming of age of the specialty so set apart. It is not so long ago that anæsthetics and radiology gave this evidence of their growth, and now there has been added to the list of Sections that of Historical Medicine*. This differs slightly, however, from the others in the intentions behind its formation, for where the interest in a section such as radiology, let us say, will necessarily be largely confined to those working with x-rays, that of historical medicine, it is hoped, will be a common meeting ground for all medical men. The historical aspect of medicine is one which may be more constantly in the minds of some than of others, and naturally there will be those whose knowledge of it will be wider and fuller, but there can be very few for whom it does not at some time, or in some respect, hold the fascination that lies in contemplating all that has gone and is going to the growth of our profession. There is no technical qualification necessary for the appreciation of history or for contribution to its records.

The work which the Section will undertake, will, in general, be the presentation to the profession of matters of historical interest in medicine There are signs of increasing efforts to gather together the records of early medical conditions in Canada, and much has been done to permanently preserve the reminiscences and experience of those whom we are fortunate in still having with us. But still more can be done in the preservation of records, and it will be not the least of the Section's work to foster all attempts to do this. There is at present no convenient place in which a central historical museum could be formed, and it is doubtful if one ever will come into being, but there is all the more need for separate collections or museums, and for the collation and record of their contents. This historical material scattered as it may be, should, however, always be available for those who wish to make use of it under the ægis of the Section.. At the annual meeting in Montreal next year for example, there should be little difficulty in displaying a great many unique records and medical historical relics. In the following year fresh stores should be available in the locality chosen.

No attempt will be made to limit the interests

* Organized at a meeting held in Charlottetown, P.E.I., during the week of the Annual Convention, June, 1928.

f the Section to Canada alone. It was thought, however, that attention should be concentrated here at first, especially as there is so much in Canada that should be collected. The *Journal* has been fortunate, in recent years, in receiving many important and well written historical contributions. It is hoped that these will continue to be sent in. The *Journal* should, indeed, as with all other matters pertaining to Canadian medicine, be the natural channel through which much of the work of the Section of Historical Medicine will reach the profession at large.

THE CANADIAN MEDICAL PROTECTIVE ASSOCIATION

The Canadian Medical Protective Association held its twenty-seventh annual meeting at Charlottetown during the course of the meeting of the Canadian Medical Association. Some important business was dealt with, and it will be of interest to bring the proceedings to the attention of the profession in Canada generally.

As will be remembered by the members of the Protective Association, a questionnaire was sent out last year, asking for opinions on the advisability of increasing the annual fee to $5.00; of which sum, $2.00 was to be set aside as a fund to deal with certain cases that might arise, in which damages were assessed against a member whose case had been fought out and lost. There had been a feeling for some time that such a fund should be built up, but the executive did not feel that they could encroach upon the present resources of the Association for it, unless the whole membership showed themselves willing to accept possible future assessments that events might make necessary.

The replies to this questionnaire were overwhelmingly in favour of the proposed increase in the fee, and in view of this the President brought forward the by-law necessitated by the alteration. This by-law authorizes the setting aside of 40 per cent of the annual $5.00 fee as an indemnity fund to meet the possible exigencies mentioned, and also permits of a further assessment of $5.00 in case of the indemnity fund becoming exhausted. It is felt by the executive, however, that the fund so formed will be quite sufficient to meet any likely contingencies and that the probability of any further assessment is extremely remote.

The experience of the Association's officers enabled them to feel fairly secure in this expectation, since they had been engaged for twenty-seven years in protecting the interests of medical men in the law courts. In that time the Association had lost only one case, and the damages had not amounted to more than $1,650.00.

It is to be remembered that many of the cases handled by the Association never go to court at all. Even if proceedings are threatened, it usually turns out, in at least three out of four cases, that acceptance of the writ by the Association's general counsel, Mr. Chrysler, K.C., is sufficient to arrest proceedings. Still, in those cases that do go before the courts, the legal proceedings are usually expensive, whether the Association wins or not. In one case the costs amounted to $4,000.00, by the time it was successfully fought through to the Court of Appeal.

Of course such expenditures are expected, and are quite cheerfully made, but the membership of the Association needs considerable strengthening before it can face many such calls on its treasury with complete equanimity. It is, therefore, with a feeling of satisfaction that we chronicle the acceptance of the by-law mentioned, under the operation of which the finances of the Association will be materially strengthened. It only requires ratification by the Governor-in-Council, after which it will come into force on January 1, 1929.

The following are extracts from the proposed amendments to the by-laws:—

"12 The annual membership fee shall be five dollars, payable on or before the first day of January, in each and every year Any person joining after July first shall pay half rates for the balance of that year

"14 Each member will be required to guarantee the payment of a further five dollars if called upon, but such call will only be made in the event of the indemnity fund becoming exhausted

"18 Delete.

"19 When the Association decides to assist in the defence of an action against one of its members, it will undertake to pay the taxable party and party costs reasonably and properly incurred along with reasonable and proper witness fees and counsel fees to be settled by the General Counsel of the Association, and such costs shall be paid out of the funds of the Association

"(a) If in any such case a verdict shall be obtained against such member, the Association agrees, if necessary, to pay the amount of such verdict up to an amount not exceeding five thousand dollars, and such costs as are properly taxed against him, provided that the Association will only pay, or contribute to the payment of damages, when the Council of the Association, upon consideration of all the facts of the case shall be of the opinion that the said verdict is one that should not have been given

"(b) The Association will not pay in respect of damages assessed against any one member, any greater amount than five thousand dollars, once, in any one year"

THE MENACE OF THE MOTOR

The number of accidents, fatal or otherwise, due to motoring, is nothing short of appalling. One only has to look at the daily newspaper to realize this. There are many reasons for it. Some of them are so obvious that we need not dwell upon them. It is said that in the United States there is one motor car for every five persons; in Canada there is one for every eleven, and the number is steadily increasing. In the Province of Quebec alone, five thousand more cars have been registered this year than in 1927. This enormous increase of traffic, in streets not designed for the purpose,in itself constitutes a potential danger. Add to this, the great proportion of cars "of ancient vintage," in all stages of decrepitude, some of them indeed, all but defunct, the mechanism of which is apt to fail at the critical moment, and it can be seen that the danger is magnified. And besides this there is the personal factor.

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But the hazard to the pedestrian and the motorist himself, through collision, is not the only one. The introduction of the so-called "ethyl gasoline" suggests another. This new type of fuel contains about one part in a thousand of lead tetra-ethyl. Some fatal cases of lead poisoning have occurred in the United States among men handling the lead compound, and lead has been found in the excreta of those working in garages where ethyl gasoline is sold. The special importance attending this particular lead compound lies in the fact that it is very readily absorbed and its effects are cumulative. It is soluble in oil and can penetrate an intact skin. This being so, and with the increasing popularity of the preparation as a motor fuel, health authorities have become very much alive to the new situation. The special dangers lie in the inhalation of the fumes, with the possibility of carbon monoxide poisoning superadded, and in the spraying of the streets with a compound of lead in a fine state of division. In the United States careful enquiry has failed to show that any actual harm has resulted in any case from the use of ethyl gasoline. But this conclusion is only provisional. Drivers of cars using ethyl gasoline showed no definite signs of lead absorption after exposures approximating two years. The Committee of the United States Federal Government came to the conclusion that there was no definite ground at the present for prohibiting the use of lead tetra-ethyl in motor fuel, provided its use and distribution were properly regulated.

In Great Britain this matter has elicited considerable interest also, and has led to interrogations in parliament, and the appointment of a special committee of enquiry under the Ministry of Health. This committee has come to the same conclusion as the American authorities. They advise, however, that ethyl gasoline be not used for cooking or cleaning. It seems evident that much more time must elapse before the effects of possible accumulation will become evident, and the danger be accurately appraised. In the mean time an attitude of watchful waiting is indicated.

Another menace, which is probably more serious, is poisoning with carbon monoxide, which forms about five to six per cent of the exhaust gas coming from automobiles. All are, or should be, familiar with the danger attendant on running the engine of a motor car in a closed garage. It is stated that an average-sized engine, running under these conditions for one minute and a half will pollute the air to a dangerous degree. Occasionally, we hear of deaths from this cause. It is not generally appreciated, however, that, short of causing death, carbon monoxide is capable of producing unpleasant, not to say disastrous, results. In this issue of the *Journal* is a very carefully prepared and thorough article by Dr. J. C. S. Battley, which will well repay perusal. The writer quotes W. J. McGurn, who studied carefully fourteen patients suffering from chronic carbon monoxide poisoning, in whom hereditary and otherwise acquired disease could be excluded. They exhibited various manifestations of toxic nerve irritation, such as peripheral neuritis, combined cerebrospinal and peripheral nerve lesions, multiple sclerosis, petit mal, convulsions, stupor, insanity, and, sometimes, glycosuria, permanent muscular weakness, vasomotor disturbances, and hyperpiesis. It appears from this article, also, that a very small amount of the gas, when absorbed, can produce very serious symptoms. The physical characters of the gas are such that it can be inhaled in small amounts unwittingly for long periods, and its etiological relation to the nervous manifestations may therefore be quite unsuspected. While there is no need for panic at the present time in regard to chronic carbon monoxide poisoning, it is again a case for watchful waiting. We note that the Board of Health, in New York, is approaching the automobile manufacturers to see if it be feasible to have the exhaust gases discharged overhead, and not along the ground, in the hope that this will lessen the risk which undoubtedly exists in congested traffic.

THE SENIOR EDITOR

At the time of the Annual Meeting in Charlottetown the Council cabled a congratulatory and grateful message to our senior Editor, Dr Blackader, who is in England. It was the occasion of his birthday.

A reply received by letter indicates that the message was much appreciated, and that he looks forward hopefully to a continued improvement in the character and usefulness of the *Journal*, with the assistance of the augmented editorial staff.

That you may understand what it is that heals wounds, for without that knowledge you may not readily recognize the remedy, you must know that the nature of the flesh, of the body, the veins, the bones, has in it an innate force which heals wounds, thrusts and such like things. . . .Therefore, the surgeon should know that it is not he that heals, but the force in the body. If the physician thinks it is he that heals he deceives himself and does not understand his art. But that you may know for what purpose you, the surgeon, exist, learn that it is to provide a shield and protection to nature in the injured part against enemies, so that these external foes may not retard, poison, nor spoil the force of nature, but that it may remain in its vital power and influence by the maintenance of such protection. Therefore, he who can protect and take good care of wounds is a good surgeon.—*Paracelsus.*

Special Articles

THE BRIDGE OF LIFE

BY MR. C. C. FERGUSON,

General Manager, The Great West Life Assurance Company

Winnipeg

It is a fact that there has been a noteworthy improvement in mortality, especially in the past quarter of a century, but the way this is frequently expressed is liable to occasion serious misconception. For instance, we are told that the duration of human life has been increasing as follows:—

In the 17th and 18th centuries at the rate of four years per century;

In the first three-quarters of the last century by nine years per century;

In the last quarter by fourteen years per century;

And in the first quarter of this century by forty years per century.

At this rate of progression we may expect that in a few more centuries people will live for at least a thousand years, thus restoring the golden prime of Methuselah—a vain hope, which I am sorry I cannot endorse!

The problem is how to express the improvement which has taken place, and this is not an easy task. It is difficult to avoid paradoxical, or seemingly contradictory, phrases, which tend to bewilderment rather than enlightenment. For instance, while the expectation of life in infancy may run from fifty-five to sixty years, the most probable year of death for human beings is the first year of life, and it is a fact that on the average a child of eight years will live for a longer time than a newly born babe. This latter seems very much like suggesting that a part of life is greater than the whole, whereas it really implies that infant mortality rates are very high. The high rates during early infancy diminish the infant's chance for longevity. We approach here the crux of the whole situation. In past generations, the wastage of infant life was appalling. It is still very great, but there has been a vast improvement during the past quarter of a century. So when people say that five, ten, or fifteen years have been added to the length of human life, they merely mean that infant mortality rates have been strikingly reduced. They do not, or at least they should not, imply that for adults there has been any similar addition to the span of life, because this is certainly not the case. There has been some improvement in the expectation of life at practically all ages, but the degree of improvement has been comparatively moderate except in early infancy.

It is not surprising that there is this improvement in mortality all through life when one remembers that certain diseases, such as smallpox, typhoid and diphtheria, once deadly, have now been practically eliminated. Tuberculosis is being successfully combatted, and, in general, great progress has been made, especially against diseases caused by parasitic microbes. Yet, there are some few people who still disbelieve in the existence of germs, and seek to remove their obvious manifestations by incantations, genuflexions and contortions. On the other hand, modern civilization has invented new agencies to shorten human life. I refer to the automobile, the railway train, the aeroplane, explosives, chemicals and wood alcohol. Turning to the credit side again, we have now a much better chance of survival against violent death at the hands of outlaws and criminals. Perhaps I should except from this remark the residents of a certain city in the United States, where, if King George did rule, there might be fewer murders.

As an example of improving mortality rates, I give below a Table showing the expectation of life for males, as found in England in the years 1911 and 1921 respectively:

Age	*1911*	*1921*
0	51.50 yrs.	55.62 yrs.
10	53.08 yrs.	54.64 yrs.
20	44.21 yrs.	45.78 yrs.
30	33.81 yrs.	37.40 yrs.
40	37.74 yrs.	29.19 yrs.
50	20.29 yrs.	21.36 yrs.
60	13.78 yrs.	14.36 yrs.
70	8.53 yrs.	8.75 yrs.
80	4.90 yrs.	4.93 yrs.
90	2.87 yrs.	2.82 yrs.

An inspection of this Table shows that the average infant of 1921 had a considerable advantage over the babe of 1911 in his probable length of life, but the Table further suggests that he soon loses the greater part of that advantage, so that at the age of 70 his prospects of further longevity will be very little better than those which face the septuagenarian of to-day. The statistics, therefore, do not so much emphasize for the modern babe the prospect of living to a ripe old age, but rather hold out a better promise that he will survive the dangers of weaning; they do not suggest, so much that he will survive many distant winters, but rather that he will have less immediate trouble from summer complaint. Centenarians are as rare

now as they were a century ago, so that the modernists have as yet no justification for translating "three score years and ten" into "a hundred."

It is not clear just what the Psalmist meant by quoting seventy years as the length of human life. I do not think that he was suggesting a basis on which actuaries could compute life-insurance premiums. Neither do I think that he had in mind the life-expectancy of an infant, or that he deduced his conclusions from any scientific study of the population statistics of his day. What he probably meant was that seventy years should be regarded as the average length of a well-rounded, normal life, not cut short prematurely by disease or injury. From this point of view his statement is correct. At least it is correct according to one of our modern mortality investigations, which shows that the average age at death of all persons who die after age of fifty is exactly seventy years.

Have I demonstrated my point? Is it clear that the cause of the recent improvement in mortality has been that a great many persons have been saved from premature death, especially during infancy, and not that the human frame is taking on any greater inherent staying powers against the ordinary wear and tear of existence? There is absolutely no proof or indication that the period of a normal life (not cut short prematurely) is any greater now than it was a thousand years ago.

The struggle for existence goes on. Do we see in Death the stern warrior, in various panoply, bloody or anæmic, waging relentless war with life which, hoping merely to prolong the combat, now seems to be effecting its limited purpose, only to yield finally to its invincible foe? Or, do we picture the Grim Reaper, now more careful not to destroy the unripe crop, but taking as of yore and in like season his harvest of the golden grain? Or, do we think of the Wise Gardener who, relentless in the present but beneficent in His ultimate purpose, thins out the fruit while yet green, but now leaves to mature a few more than in times past accorded with His judgment? At the same time, do not think that I am minimizing what has been accomplished. The prolongation of life, especially among the youthful, is a great achievement, a tribute to the efficiency of modern civilization.

I have compared the mortality rates based on population statistics of England, Scotland and the United States of America. Of these three countries, England appears to have the lowest mortality rates and Scotland the next lowest. It is possible that in Canada and Australia still lower rates prevail, but I have not the material at hand to state definitely.

In every population investigation, it is found that females have a greater expectation than males. On the other hand, males whose lives are insured show lower mortality rates than females, while in connection with life annuities the reverse is the case. It almost seems to the life companies that a woman who buys an annuity straightway takes on immortality!

But the question remains how can the improvement in mortality be best expressed? Is there any appropriate index figure which will briefly tell the story? Certainly the expectation of life for the new-born babe is a misleading guide. Perhaps as good a method as any would be to use the expectation of life for age ten and in conjunction therewith note the probability of survival from birth to that age. This really involves the use of two index figures. The following table shows these index figures for the mortality of English males for the years 1911 and 1921.

	1911	*1921*
Probability of infant surviving 10 years	81.2 per cent	85.7 per cent
Expectation of life at age of 10	53.08 yrs.	54.65 yrs.

These figures, however, give no indication of the variations in the rate of mortality for particular ages. Such variations are wide, and the only strictly accurate method of comparing two mortality tables is to use about a hundred index figures, namely, the rate of mortality for each age of life.

Considering the expectation of life shown above for the age of 10, it would be possible to calculate a rate per century for the gain in longevity, but I will not contribute to further misconception by calculating it. It would obviously be much less than the forty years referred to at the beginning of this paper, and it is very improbable that the gain recorded for the decade will be maintained in like proportion during the whole of the century.

It is an interesting speculation to estimate what is the maximum expectation of life that can be realized for the new-born infant. Using in this connection an imaginary mortality table, based on the more favourable population and insurance statistics available, and eliminating all excess mortality at infantile ages, I find that such maximum expectation would be sixty-five years. My prediction is that it will be a long time before this is generally realized.

The improvement in mortality is naturally of very great interest to life-insurance companies, but as insurances are practically never issued to infants (save in the form of savings contracts which are really not insurance), the improvement in infant mortality has had no effect on the prosperity of the business. Life insurance, has, however, benefited greatly by the improvement in adult mortality rates, but not to the extent that one might suppose who generalized from the improving life expectancies of infants.

The question is often asked why the companies do not lower the cost of insurance to the public, considering the increasing profits they must be making in view of improved mortality. My answer is, first, that, as I have pointed out, these profits have not increased to the degree that the superficial observer might suppose; and, in the second place, I would reply that the cost of life insurance has been reduced considerably, so that it is now lower than it has ever been in previous history. Perhaps I may be permitted to ask the critic how many other lines of business there are which can make the same claim. It is true that there has not been much change in the average premium charged for participating insurance, but the profit refunds to the insured have been enormously increased, resulting in the noteworthy decrease in net cost of which I have been speaking. On the other hand, the rates for non-participating policies have been materially reduced, and I believe the reduction has been greater in degree than would have been justified solely by the decreasing mortality rates.

In discussing mortality statistics the term 'expectation of life'' is always employed, but it may be stated, as one of the paradoxes of the subject, that actuaries do not use the expectation of life in calculating premium rates. For technical reasons, it would be incorrect to do so. They have to use a more intricate method, involving a consideration of the mortality rate for each year of life, and this tempts me to present to you a picture of human life, as the actuaries see it, and as it was described by Addison in his ''Vision of Mirza.''

'The bridge thou seest is human life; consider it attentively.' Upon a more leisurely survey of it, I found that it consisted of three score and ten entire arches, with several broken arches, which, added to those that were entire, made up the number about an hundred. As I was counting the arches, the Genius told me that this bridge consisted at first of a thousand arches; but a great flood swept away the rest, and left the bridge in the ruinous condition I now beheld it. 'But tell me further,' said he, 'what thou discoverest on it.' 'I see a multitude of people passing over it,' said I, 'and a black cloud hanging on each end of it.' As I looked more attentively I saw several of the passengers dropping through the bridge into the great tide that flowed underneath it, and upon further examination perceived that there were innumerable trap-doors that lay concealed in the bridge, which the passengers no sooner trod upon but fell through them into the tide, and immediately disappeared. These hidden pitfalls were set very thick at the entrance of the bridge, so that throngs of people no sooner break through the cloud but many of them fell into them. They grew thinner towards the middle, but multiplied and lay closer together towards the end of the arches that were entire. There were indeed some persons, but their number was very small, that continued a kind of hobbling march of the broken arches, but fell through one after another, being quite tired and spent with so long a walk.

Observe, if you please, how scientific, as well as artistic, is Addison's ''Bridge of Human Life.'' He did not represent each individual as walking out on the bridge until his expectancy was reached and then dropping off simultaneously with all others of his generation. On the contrary, he showed the infants perishing in large numbers; he showed a much lower mortality among those in robust youth, with increasing rates for later life. He accurately described the various diseases as ''trap-doors'' and ''pit-falls'' to prematurely catch the unwary or unfortunate. If Addison could return now, he would find that many of these trap-doors and pit-falls have been at least partially built up, and I imagine he would join with me and with you in expressing gratitude to those agencies and individuals which have been so diligent in the work of repair—to the colleges of medicine and science; to the doctors and nurses; to all the organizations that deal with public health and sanitation. The improvement has not come about fortuitously, it has been the result of study and effort of a high order. The wonder is that there are still some who will not give to science the credit she has fairly won, but who persist in their reliance on irrational remedies, which are really undermining the arches of the Bridge of Life, instead of strengthening or repairing them.

An Address

ON

MATERNAL MORTALITY FROM PUERPERAL SEPSIS * †

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It is unnecessary in these days to emphasize the tragic importance to the community of the large mortality amongst young women which is incurred yearly through childbearing and childbirth. In these islands the maternal death rate is about 4,000 each year; between 1911 and 1926 inclusive there were 66,421 deaths from these causes in England and Wales. Septic infection is by far the most important single cause.

This loss by death, however, is in some ways not the gravest consequence of child-bearing, for we have come to realize that, for each mother so lost, there are many more whose health is in varying degrees chronically undermined by the damage they have sustained in childbed. Infection and mechanical damage thus acquired are amongst the main causes of the frequent chronic ill health which dates from childbirth. We can assess within accurate limits the loss by

* Abstract of an address communicated to the Edinburgh Obstetrical Society, May 9, 1928, (*Brit. M. J.*, 1928, i, 967).

† Many of the statistical quotations are omitted for lack of space (ED.).

death, but of the incidence of persisting invalidism of child-bearing origin we have no exact knowledge. We know with certainty, however, that many of the common gynæcological disorders, the uterine hæmorrhages, the leucorrhœas, the pelvic pains, the displacements, etc., and many general disturbances, debility, indigestion, neurasthenia, rheumatism, etc., are to be traced to the lesions of childbirth. It is probably not an over-statement to say that about 60 per cent of hospital gynæcology is a legacy from vitiated childbearing, and of this a very large part falls into the category of infection. Septic inflammation of the genital canal during labour or in the puerperium may, as a useful basis for analysis, be considered as falling into one or other of three clinical types according as it is caused by (1) contagion, (2) trauma, or (3) auto-infection.

In the case of *contagion* we are dealing with an invasion of the passages by a virulent septic micro-organism, which is introduced from without. Here, as in other infective diseases—for example, scarlet fever, erysipelas, typhoid, or tetanus—our etiological quest is dominated by the consideration of the nature, virulence, and source of the infecting microbe. This type of puerperal infection is seen in its simplest form when it occurs after a normal, easy labour, with an absence of trauma of the maternal passages, and in this category are to be classed the epidemic scourges of the maternity hospitals of a former day.

Puerperal sepsis due to *trauma* is, in its essential etiological features, entirely different from that caused by contagion. Here the factor which dominates the issue is a lacerating or contusing damage of the walls of the birth passages, and the source and nature of the infective organisms become a matter of comparatively secondary importance. By this is meant that it is the trauma of the soft parts that determines the risk of sepsis. The infecting microbes which can determine the infection in such a case are notoriously widespread in nature. They may be considered as being derived exogenously or endogenously; in either case they may conceivably consist of micro-organisms which only cause disease when settling in devitalized tissue. The point of clinical importance, however, is that these somewhat theoretical matters concerning the origin of the microbe are overshadowed by the vital issue of trauma.

The third clinical type of puerperal fever is that caused by *auto-infection*. Here the micro-organisms which set up the pelvic inflammation are, in some cases, present in the genital canal before labour begins—for example, in an infected cervix. In other cases they reach the genital passages from some distant source by direct spread or by implantation—for example, from the bowel—or they may travel by the blood stream from areas of focal infection in teeth, tonsils, etc. Auto-infection, like contagion, operates in its simplest form when it supervenes in a normal spontaneous birth in which there has been a minimum of interference and trauma. Before we can hope to grapple with the menace of puerperal fever a knowledge of the manner and degree in which these three factors operate is necessary. Until we have this knowledge much of our effort must be largely haphazard.

AUTO-INFECTION

Within recent years many observers have attempted by this means to explain infection occurring in those spontaneous cases which have not been examined at any stage of labour. It is clear that, if operating in an appreciable ratio, it would go far to explain the persisting high death rate from sepsis despite the application of the aseptic principle. Victor Bonney and others have urged its importance with considerable force and plausibility, and its possible significance is referred to in the recently published report of the Committee appointed by the British Medical Association (*Supplement* to the *British Medical Journal*, April 28th, 1928, Appendix iv, p. 165). Undoubted examples of autogenous infection can be cited; for instance, puerperal fever arising during scarlet fever, erysipelas, etc. A consideration of the available data, however, suggests that as a factor in the death rate autogenous invasion probably plays a minor part. Suggestive evidence may be found in an analysis of the records of many extensive maternity practices at the present day. The extern practice of the Edinburgh Maternity Hospital shows a consecutive series of about 5,000 spontaneous births with 2 deaths from sepsis; the extern department of the Birmingham General Hospital records 888 cases with an absence of sepsis mortality; whilst there is the record of 47,503 deliveries, both normal and abnormal, in the unselected practice of the East End Maternity Hospital in London with 5 deaths from sepsis, or 1 in 9,500. The practice of the Queen Victoria's Jubilee Institute midwives is likewise instructive. During 1927 there were 53,502 deliveries with 6 deaths from sepsis in normal spontaneous births, or 1 in 8,900 of the total. If we include all the deaths in this record of 53,502 cases which can directly or indirectly be attributed to sepsis, and including normal and abnormal cases, we get a maximum figure less than 0.5 per 1,000. To the production of this figure all causes have contributed. The fact which seems to emerge clearly from these data is that the very small sepsis rate in these large and unselected bodies of women is an argument against self-infection operating alone being an appreciable component of the sepsis death rate in the rest of the community. It is especially important that our ideas on this question be clarified, because much of the uncertainty and confusion in the minds of those who are anxiously seeking a remedy for the present state of affairs springs from the difficulty in assessing the true significance of this factor.

Much recent bacteriological research has been directed to the elucidation of these questions,

more especially in an attempt to relate the vaginal and cervical flora with the incidence of puerperal sepsis. As a result of this work we must now concede a comparatively frequent occurrence of streptococci in the genital passages of pregnant women, but, although it is established that puerperal infection is commonly caused by strains of streptococci, there is no evidence that the streptococci frequently present in the genital canal can play any part in initiating this infection. The fact of their frequent presence, combined with the rarity of puerperal sepsis in the absence of other factors which have a determining rôle, such as trauma, implies that this streptococcal flora possesses practically negligible primary virulent properties.

CONTAGION

Contagion is known to play a part in puerperal sepsis at the present day, as witness pelvic infection following contact with the virus of scarlet fever, or the epidemic deaths which occasionally occur in maternity homes and hospitals. To study the features of this type of infection satisfactorily, however, we have to turn to the records of the pre-Listerian lying-in hospitals. Epidemic waves of the disease were, as is well known, the scourge of these institutions. For example, in the large hospital at Vienna, out of 21,120 women delivered from 1840 to 1846, 2,260 died, or about 1 in every 10 mothers delivered perished, chiefly from puerperal fever. In 1774 at the Hôtel-Dieu, Paris, every patient attacked died—altogether about half the patients confined in the hospital.[2] The striking lesson for us is that, in these old hospitals, puerperal fever would seem to have been so predominantly a matter of contagion that other factors were largely negligible. I have been strongly impressed with this somewhat remarkable fact during a recent study of the records of the old Edinburgh Maternity Hospital. From 1823 to 1844, out of 3,906 women delivered in this hospital, 75 died from all causes. The records are not complete enough for an accurate differential analysis of the causes of death for this whole period, but in one of his striking papers on puerperal fever Sir James Young Simpson[1] gives accurate data for the period from 1823 to 1837, when there were 47 deaths among 2,890 women delivered; 36 out of these 47 deaths were, according to Simpson, due to puerperal fever. When we turn to the records we find that the distribution of these deaths is instructive. We discover that 30 occurred in three years, when obviously contagion was rife. On the other hand, during the four years 1826 to 1829 inclusive there were 821 successive births without a death. We may deduce from this that during this period of fifteen years, when contagion was eliminated, there was little or no mortality from puerperal fever.

The records of other hospitals exhibit the same facts.

The fact that contagion was the dominating cause of puerperal fever in those days is brought out also by a study of the records of the outdoor practice of the hospitals. In this connection the records of the Edinburgh Maternity Hospital from 1826 onwards, which I have recently had an opportunity of studying, are instructive. Between 1826 and 1857 there were 15,144 successive deliveries with 61 deaths—that is, a rate of 4 in 1,000. The cause of death is given in 44, and in 19 it is stated as puerperal fever—that is, about 43 per cent. If we assume that this figure applies throughout the series the sepsis deaths would represent under 2 per 1,000 deliveries. I have shown that, in the outdoor department, there were considerable periods without any mortality from sepsis, clearly due to the chance absence of contagion. The same is true of the outdoor practice. Thus there is a record of 3,288 successive births during the nine years from 1839 to 1847 with no sepsis deaths. The elimination of this element brings the total death rate during this period down to 5 in 3,288, or about 1.5 per 1,000. These figures naturally challenge comparison with the practice of the art at the present time. Before any legitimate comparison is possible, however, it must be recognized that the above figures refer to deliveries and abortions, and do not include deaths from such complications of pregnancy as hyperemesis and ectopic gestation, which appear in the ordinary maternal mortality returns of the present day, and which constitute about 10 per cent of the deaths in the Registrar-General's Report for Scotland.

The limited figures just quoted support the belief that during the past hundred years there has been no depreciation in maternal mortality, and this is in accord with the national statistics. For Scotland the decennial mean figures from 1855 to 1914 are 4.9, 5.1, 5.2, 5.3, 4.6, and 5.6 per 1,000 births, and the mean for the period 1915 to 1922 is 6.2. Likewise the proportion of deaths from sepsis during this period has shown little change—namely, 1.7, 1.8, 2.0, 2.5, 1.9, 1.7, 1.7.

To realize the significance of these findings we must visualize the manner in which childbirth was managed in the pre-Listerian days and how this differed from our modern methods. The first fact of which we must remind ourselves is that our predecessors had no knowledge of aseptic or antiseptic procedure. It is abundantly clear that it is to this we must attribute in the main the ravages of puerperal contagion, for they examined freely during labour, and, in cases of retained placenta, they had no hesitation in introducing the hand into the uterus. Abdominal expression of the placenta by the Credé method did not, in point of fact, come into use till about 1867. The other important fact regarding the practice of those days is that it was based firmly upon the teaching of Harvey, Smellie, Hunter, Denman, and others, who insisted that child-bearing was a physiological process, which must be left to Nature, and which

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was apt to be vitiated by interference on the part of the accoucheur. This was to be stringently withheld until Nature's effort had unmistakably failed. Instruments of any sort were the last refuge. Simpson, for example, in the Edinburgh Maternity Hospital, used the forceps in 1 in 472 labours, and other hospitals had a similar record

These old records have a further bearing on the subject-matter of our discussion, for, as we know, there was little regard paid to the danger of repeated vaginal examination. Despite this, and the obvious and common contamination of the genital passages which must have then occurred, there was a negligible mortality from sepsis except where virulent contagion was present. This suggests that the microbes introduced by such contamination had little infectiveness in the case of labour conducted with a maximum regard to physiological needs.

The records of these pre-Listerian times would seem to suggest that, although contagion was a common cause of death, trauma was a factor which operated comparatively rarely, and this we must attribute to the principles which then underlay the practice of the art. I have shown that so strongly was this the case that at times the results obtained by our forefathers were such as compare favourably with the best practice of the present day.

It would clearly be to our advantage could we analyse the factors that stand behind the present high rate of sepsis as satisfactorily as is possible in these older records. Unfortunately in modern times the subject is hedged around with difficulties and uncertainties that make the study baffling in its complexity.

CONTAGION AS A FACTOR IN THE PRESENT SEPSIS DEATH RATE

How far contagion or trauma, or both combined, are responsible for the death rate from sepsis at the present time we have no accurate means of discovering. The massive sepsis of the pre-Listerian days, when surgical contagion repeatedly overwhelmed the surgical and maternity wards and often spread into extra-hospital practice, is no longer with us, and it would seem certain that the elimination of this virulent and spreading contagion must necessarily have led to a lessening of this contact factor in modern practice. Despite this, however, we know that contagion does still operate—as, for example, where the scarlatinal virus is transmitted to a parturient woman, or where two or more women are clearly infected from one common source. The exact extent to which infection so conveyed is responsible for modern sepsis is, however, more difficult to define than in the case of the older records. Whilst this is so, we are not altogether without evidence. The figures I have already quoted in connection with auto-infection are again of service here. In the outdoor practice of the Edinburgh Maternity Hospital, for example, during four years there have been about 5,000 normal deliveries with 2 deaths. During the year 1927 there were 53,502 deliveries in the practice of the midwives of the Queen Victoria's Jubilee Institute in England and Wales with 6 deaths from sepsis in normal births—that is, 1 in 8,900 total deliveries, or about 0.1 in 1,000. This total figure refers, of course, to all cases, normal and abnormal. If we exclude the forceps cases we get a figure approximately equal to 1 in 8,000 or 0.12 in 1,000. This indicates the rarity of contagion in the practice of midwives, and when we remember that in England and Wales over 50 per cent and in Scotland over 30 per cent of the maternity service of the community is in their hands, we have ample reason for the belief that, in this proportion of the country's service at least, contagion is of comparatively minor importance. Then we have a record of 47,503 successive cases in the outdoor and indoor practice of the East End Maternity Hospital, with a total of 5 deaths from sepsis, or 1 in 9,500 cases. It is, of course, not necessary to conclude that all the sepsis deaths in these records are due to contagion. The figures are quoted with the object of indicating the maximum possible mortality from this cause when this is operating alone. It is not easy to conceive any reason why this small ratio of contagion should be appreciably different in the rest of the community not covered by these precise records. In other words, the above analysis leaves in one's mind the impression that contact infection, while it does admittedly still occasionally operate to maintain the incidence of fatal puerperal sepsis, is probably a factor of comparatively minor value, and that to explain the persistently high rate in modern practice we have to direct our attention to other factors.

CONTAGION IN PRESENT-DAY HOSPITALS

At the same time the magnificence of the era inaugurated by Lister is apt to blind us to the fact that even in the hospital system of our own times there are still perpetuated in some degree the risks with which our forefathers battled in vain. There is still intrinsic in it the danger incidental to the assembling of numbers of parturient women within four walls. The reality of this risk is at once apparent when we recall that, whilst the main practice of such hospitals is concerned with normal childbirth, it is also largely engaged in serving, and in attracting to itself, often from a wide district, the abnormal, which is often synonymous with the frankly or potentially infected case. This is especially true of the large central hospitals, where the fact of numbers naturally multiplies the risks. A study of this problem has long convinced me that these risks are by no means negligible. Even when the technique of the hospital is good, the risk of the leakage from infected to clean case can never be completely blocked, more especially at times when the hospital practice is working at high pressure.

In support of these contentions I may quote the figures of one well-known hospital, for which I am indebted to the registrar. During four

years, in 4,278 normal spontaneous deliveries there were 72 cases of puerperal fever with 5 deaths. In yet another well-known hospital during one year there were reported 11 instances of puerperal infection in spontaneous births with 3 cases in which which the birth is described as quite normal. The report of another large hospital shows that, out of 27 deaths from puerperal infection in one year, there were 4 deaths in women in whom the birth was spontaneous and uncomplicated. These hospitals are all actively engaged in abnormal midwifery in addition to catering predominantly for the normal birth. The problem is thus seen to be a complicated one.

The admission, the examining, the labour rooms, and the wards of the two sets of cases must be rigidly isolated from one another, and the same rigid separation must apply to the nursing. The risk of patient-to-patient transmission is further lessened by the adoption of the small ward principle, especially for the abnormal delivery. In many instances we know that maternity hospital buildings are inadequate, and, in their present state, are unable to meet the demands which a rigid application of the modern ritual of prevention implies. I feel that, although the consideration of such questions introduces matters of some delicacy, it is urgent that they be reviewed in the frankest possible manner at this time, because as we all know, there is a strong advocacy in some quarters of an increase in maternity hospital accommodation as one means towards remedying puerperal mortality and morbidity. Whilst finding myself in sympathy with this attitude, I must admit that I consider any such widespread experiment as having elements of danger, except it be carried out with the most stringent regard to the safeguards I have mentioned. The exact proportion of the total sepsis death rate which this hospital contagion implies we have no means of determining. That, however, we may safely consider it as comparatively small is indicated by the meagre share of the total births which occur in hospital. The maternity hospital beds officially known by the Ministry of Health to exist in England and Wales number only 2,290 in 149 institutions (Janet Campbell, *Protection of Motherhood*, 1927, p. 64.)

TRAUMA

I have already stated that the factors behind the persisting sepsis rate are complete. One example of this suggests itself to the mind. It is often urged that we have lost to parturient women the advantages of a century's progress because we have vitiated child-bearing by a too great recourse to instrumental delivery. It is true that interference with the natural process, by instrumental or other means, was in the old days employed at the most in only one out of several hundred cases, and that, even under the best conditions nowadays, such physiological child-bearing is only rarely found. Even in the case of the practice of the Queen Victoria's Jubilee midwives, who, it may be argued, deal with the most normal class of case, the forceps deliveries number about 6 per cent of the total, and in the East End Maternity Hospital, where physiological childbirth is rigidly aimed at, the instrumental rate is over 2 per cent. Over the rest of the community we may safely conclude this rate is still higher. Faced by this indisputable evidence it is not surprising that many have urged that trauma is at the back of modern sepsis. It cannot be denied that there are cases—and every member of the staff of a maternity hospital can quote instances—in which unjustified interference has led to disaster. On the other hand, to argue on the basis of such individual cases—which usually spring from lack of experience and well-intentioned though over-anxious zeal—that trauma inflicted by malpraxis is the essential cause of the persisting death rate is to lose sight of other factors which have a wide-reaching significance.

One of these factors concerns the possible change in the fitness of women for child-bearing and childbirth as compared with their sisters a century ago. During this period there have been gross changes in the mode of life and feeding of the community. Moreover, we have to consider the possible and special bearing of rickets. It is not improbable that the increased protection of child life, which constitutes one of the most remarkable features of modern social hygiene, may have increased the proportion of those with skeletal defect who survive into adult life. As as obstetrician practising amongst the same class of women as those with whom Sir James Young Simpson had to deal nearly a century ago, I am convinced that the need for intervention on mechanical grounds is now greater than it was then, when forceps were employed only in 1 in every 472 cases.

Whilst it is thus probable that traumatization has played in recent times an increasingly important part in puerperal sepsis—and the data analysed earlier in this paper would seem by a process of exclusion to lead the evidence incriminatingly in this direction—it is at the same time not improbable that at the back of it there are some structural factors not wholly within our control, and therefore not wholly preventable by us as obstetricians. There are, however, many indications pointing towards a better and possible provision for the parturient woman if we are prepared to take advantage of them. The practical conclusion to which my studies have led me is that, whilst auto-infection can be largely displaced from the platform to which it has been raised by some, and whilst contagion likewise probably plays only a secondary part, to trauma from interference it would seem we have to ascribe the chief agency in the maintenance of sepsis, although we are not warranted in assuming that the main burden of responsibility is to be placed on the medical attendant.

The fact that, with a well-organized maternity service, a greatly diminished mortality rate is obtainable points clearly the way to progress,

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and suggests that the immediate problem for the community is the provision of better machinery for bringing to the help of labouring women the knowledge we possess, rather than the pursuit of a mark-time policy which awaits the outcome of further research.

In support of this contention I would instance the experience of the Queen Victoria's Jubilee Institute, which last year had the splendid record of 53,000 deliveries with a mortality of 72, or 1.3 per 1,000. It is to be noted that these figures refer to the combined practice of midwife and doctor, for medical practitioners were called in to the aid of the midwife in 25 per cent of the cases. It is a very successful and encouraging example of team work. The midwife's task is only made possible when it is united to the knowledge that she has the doctor behind her is case of need, whilst, on the other hand, the fact that the routine management of the practice is in the hands of the midwife makes for the possibility of a more physiological attendance of the normal case than is to be expected from the practitioner, with whom midwifery is often a disturbing item in the course of a busy day interspersed with urgent calls, and from whom, moreover, regardless of every other consideration, there is too often demanded a speedy termination of labour. It may be argued that the small death rate in this large practice is dependent upon the fact that the midwives' cases are to some extent selected. This is not denied, and that this selection is not inconsiderable is suggested by the very low death rate in the series from puerperal convulsions and albuminuria—from 0.1 to 0.2 per 1,000, as contrasted with a death rate over the rest of the community of from 0.6 to 0.8 per 1,000. Making every allowance, however for these facts the record is full of encouragement, and points to the advantages to be obtained from a wider extension of the midwife-doctor system.

The signal advantages of such combination are even more convincingly demonstrated by such an institution as the East End Maternity Hospital in London, where the bulk of the cases are conducted by midwives, and abnormal cases are treated by medical practitioners on the honorary staff. This institution conducts over 2,000 cases yearly, about half being in the hospital. There is a well-organized ante-natal system, and the forceps rate is under 3 per cent. Despite the fact that the practice is amongst the very poor, and that it is practically unselected, it has a mortality rate standing at a little over 1 per 1,000 cases. For four years, in a total of about 9,000 cases, it sank to the extremely low level of 0.67 per 1,000. Sepsis is practically eliminated from this practice, and there can be little doubt that this is due mainly to the excellent administration, the careful supervision, and the low instrumental rate.

It is to be specially observed that the admirable results obtained in the case of these extensive practices flow entirely from the method and machinery emplcyed. There is installed by comparatively simple means a system by which—and this is especially noteworthy in such an institution as the East End Maternity Hospital—the physiological management of labour is encouraged, the abnormal case is seen betimes, and difficulty and danger are thereby anticipated and prevented. The record of this institution and its almost complete freedom from sepsis is one of the most cogent arguments in support of the contention that the dominating factor behind sepsis in ordinary midwifery is trauma. So remarkably successful has this hospital been in its effort to expel from its doors not only sepsis, but also the other complications of labour and the puerperium—for example, eclampsia—that we might at first sight feel ourselves compelled to attribute the result to some unduly favourable circumstance in the material of their practice. Against this, however, it may be urged that the official records show that the death rates of the communities in which this hospital carries on its work are several times greater than that exhibited by the indoor and outdoor practice of this institution.

It cannot, I believe, be denied that the evidence furnished by an enlightened and critical analysis of all the various forms of maternity effort we have reviewed goes to support the contention of Fairbairn[3] and others that "a country's maternity service is best built on the foundation of a service of midwives with medical help in difficult cases." Before this ideal can be universally realized much must be done in the way of education of the public and in the reorganization of the present machinery of practice. Doctors can do a great deal in both directions, and there is ample evidence to hand that in these objects they can count on the help of the central and local authorities. The problem in any area can only be satisfactorily dealt with by strenuous local effort.

The high death rate in some areas invites the suggestion that on occasion the subject may become eminently a matter for the active interest and participation of the local body.

CONCLUSIONS

1. Autogenous infection is a minor primary cause of fatal puerperal sepsis.

2. Contagion is probably of comparatively secondary importance. The well-established risks of contact infection in hospitals call for care in the extension of the hospital system of maternity service.

3. There is evidence that trauma is the most important cause of the death rate from sepsis. This is not entirely a problem involving the medical attendant; it has implications of a wider nature.

4. The immediate need is an improved machinery for maternity practice based on a midwife-doctor combination. From the standpoint of immediate policy the importance of this

overshadows all other considerations—for example, "research"—and there is reason for the hope that by this means alone a lessening of the death rare is possible.

5. Improved education of the public, the midwife, and the student, and the assistance of the central and local authority, are all necessary for the creation and working of a satisfactory machine.

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2. SPENCER, H. R., The History of British Midwifery from 1650 to 1800, London, 1927, p. 156.
3. FAIRBAIRN, *Brit. M. J.*, 1927, i, 47.

DR. FORDYCE, in the discussion following this paper, regarded the question of segregation of confinement cases in hospitals as an important one, and doubted whether it was advisable for normal cases to be confined in hospitals where there was only a limited amount of space. He thought that forceps delivery in selected cases prevented the trauma which might otherwise be caused by a very delayed labour.

PROFESSOR HENDRY referred to three cases of pyrexia due to extraneous origins—namely, infective rhinitis, commencing whitlow, and a septic wound on the skin of the patient's husband; these showed the importance of contagion. He supported very strongly Dr. Young's principle of separate accommodation in maternity hospitals for cases sent in after intervention outside.

DR. MILLER showed by statistics of the Royal Maternity Hospital that the incidence of pyrexia in patients delivered instrumentally was much larger than in those whose delivery had been spontaneous. He had found a marked variation in the bactericidal power of the blood in pregnant women, which might explain the variation in individual susceptibility to infection.

DR. J. M. BOWIE regarded trauma as of great importance in puerperal sepsis. He thought that the whole machinery of maternity service in this country needed overhauling. Reorganization might be effected in two ways: (1) by the present system of trained midwives working alone in normal cases and assisted by doctors in difficult cases; or (2) since midwifery work appealed to many doctors a new race of specialists might rise, who would confine themselves to it.

The PRESIDENT thought that hæmolytic streptococci might be rendered temporarily inert by the normal vaginal secretion, but in certain circumstances they might regain their hæmolytic action. He urged the segregation of complicated cases, but to do this a large hospital was required. He did not think that trauma was only due to instrumental intervention, since normal labours were often associated with very severe trauma. He considered the co-operation of midwives and medical practitioners an excellent practice.

THE FOUNDER OF THE RED CROSS

In connection with the centenary of the birth of Henri Dunant, the founder of the Red Cross, which occurred on May 8th of this year, the Canadian Red Cross proposed a competition in editorials on his life and work and his influence in promoting humanitarian standards and service first in war and now in peace. His idea, from which the Red Cross sprang, not only produced a very great improvement in the care provided for sick and wounded soldiers, but has also resulted in a world-wide peace-time organization for the improvement of health and the mitigation of suffering.

A committee of well known writers made the awards. The following editorial by Mr. H. B. Christie in *The Expositor* of Brantford, Ontario, won one of the prizes among the dailies. The celebration of Henri Dunant's birth and work took place in one form or another in fifty-four countries. [Ed.]

"The vision of the young Swiss philanthropist, Henri Dunant, gave to mankind one of the most chivalrous and beneficent organizations in the history of civilization, the Red Cross. In the ultimate working out of his ideal, he made an extraordinary contribution to the advancement of the social welfare of the world. Hence the Red Cross Societies throughout fifty-nine nations are celebrating to-day the centenary of his birth. which took place on May 8, 1828. It is probable that Dunant derived the inspiration for his work from the heroic mission of Florence Nightingale, who, impelled by the revelation of the terrible conditions prevailing on the battlefields and in the hospitals of the Crimea, organized a band of devoted nurses to care for the wounded and dying soldiers, to supply their necessities, relieve their sufferings, and comfort them by a ministry of love and kindness.

The event which stirred the sympathies of Dunant, and aroused him to action, was the agony and suffering which he witnessed as a youth, thirty-one years of age, at the bloody battlefield of Solferino, on the plains of Lombardy in 1859, one of the most sanguinary conflicts of history. In this battle the allied armies of France and Sardinia, to the number of 150,000, superbly led by Napoleon III, Victor Emmanuel and Marshall MacMahon, utterly routed the Austrian army, which numbered upwards of 175,000, under the personal command of the Emperor Francis Joseph. The slaughter was appalling. The battlefield was strewn with 40,000 killed and wounded soldiers, and the ghastly scenes of suffering and death witnessed by Dunant, as the terrible conflict ebbed and surged through sixteen long hours, as the dead and dying were trampled by the advancing armies, crushed by galloping artillery, ruthlessly trodden down by the iron hoofs in fierce cavalry charges, made an unforgettable impression on his mind, and he wrote the book, 'A Souvenir of Solferino,'

in which he vividly portrayed the gruesome horrors of the battlefield.

His purpose in portraying these scenes of horror and suffering, in which the wounded and dying were left without adequate medical attention and nursing, was to call the attention of the civilized world to the cruel inhumanities of war, and to cause something to be done for the relief of the wounded and suffering soldiers. "Would it not be possible," asked, "to found and organize in a'l civilized countries permanent societies of volunteers which, in time of war, would render succor to the wounded without distinction of nationality?" Out of this suggestion came the noble and chivalrous philanthropic organization known as the Red Cross.

The idea was developed by Monsieur Gustave Moynier, president of the Society of Public Utility in Geneva and a jurist of international repute. Monsieur Moynier organized a committee of five to carry out Dunant's suggestion. This committee invited the governments of Europe, together with noted military, medical and philanthropic personages, to attend an international convention in Geneva on October 26, 1863. The convention was attended by thirty-six delegates, representing fourteen nations, and six charitable and benevolent associations. As a result the Swiss government called an official convention, which assembled in Geneva the following year. On August 22, 1864, what is known as the Geneva Convention, was signed by the delegates of twelve European nations, whereby, under the terms of the agreement, hospitals, officials of the sanitary service, volunteer nurses, inhabitants of the country aiding the wounded soldiers, and even the wounded soldiers themselves, were declared to be neutral. The terms of this convention were extended to naval warfare by The Hague convention of 1899. The Geneva convention was revised and replaced by the Washington convention of 1906.

Thus was brought into existence this great philanthropic organization, which was designed to supplement the medical and sanitary services of the armies by trained volunteer societies, and to minister relief in war, epidemics, famines, floods and disasters of every kind. It has been an incalculable blessing to humanity, and on the occasion of many conspicuous catastrophies afforded relief to stricken and suffering humanity. During the Michigan fires, in 1881; in the yellow fever epidemic in Florida, in 1888; in the Johnstown flood, in 1889; in the terrible Russian famine, in 1891; in the Armenian massacre, in 1896; in the Galveston disaster, in 1900; in the Mont Pelee eruption, in 1902; in the San Francisco earthquake, in 1906; during the terrible earthquake in Japan, in 1925; in which 99,331 were killed, 103,733 injured, and 43,746 were missing; and on many similar occurrences, the Red Cross rendered heroic and faithful service, thereby vindicating its claim to be one of the greatest humanitarian agencies in the world. It reached its climax in the services rendered to the various nations in the Great War, and in numerous calamities of plague, famine and pestilence which occurred in Europe after its termination. It performed invaluable services in regard to prisoners of war, in the identification of missing men, in furnishing information of every possible kind, in the distressing problems of internment and deportation of civilians, hospital staffs, hostages, and refugees, in the repatriation of families in the invaded and devastated areas, and in ministering to the necessities of the homeless, sick and suffering in the plague stricken districts of Europe.

Perhaps the chief glory of the Red Cross has been the extension and adaptation of its work, under the Covenant of the League of Nations, to the needs of the world in times of peace, such as the improvement of health, the prevention and eradication of disease, and the amelioration of suffering wherever it is found. In pursuance of this policy the Canadian Red Cross has cared for the needs of ex-service men, and has established nurseries at the seaports where, during 1927, help and comforts were provided for 30,000 new Canadians. Classes were conducted in home nursing for 12,000 women and girls, and hospitals and nursing stations were maintained in pioneer settlements, ministering to the needs of an extensive population. It has provided relief in disasters such as the Northern Ontario conflagration and the Cochrane epidemic, promoted measures for the public health, and distributed large quantities of instructive literature. Moreover, it has introduced the Junior Red Cross into the schools of Canada, whereby, in five thousand classrooms, 140,000 young Canadians are given instruction in healthful living. It has provided treatment for 5,000 crippled children, and befriended the unfortunate in innumerable ways. In carrying on this beneficient work the Canadian Red Cross has expended $7,000,000 and exhausted its treasury, but it has established its claim to the generous support of the people of Canada as a national institution of a philanthropic character, that knows no distinctions in its sympathetic and helpful service. The Red Cross, in carrying on its ministry to suffering humanity, is an exemplification of Him who went about doing good, and who said: 'It is more blessed to give than to receive.' "

The name "antimony", dating from the 15th century, has an interest all its own. One Basil Valentine was called on to treat a community of monks, and used a drug, then known as stibium, for the purpose. The monks died, and the name antimony was born. The French original and present day word being "antimoine," from "anti-moine," which in English is "anti-monk."

Men and Books

THEORIES ABOUT THE MOVEMENT OF THE BLOOD WHICH WERE HELD BEFORE HARVEY

BY THE ASSOCIATE EDITOR
Montreal

The year 1628 marks the beginning of a new epoch in the history of medicine, for it was in that year that William Harvey, a London physician, published a book, small in size and humble in appearance, but great in matter—*Exercitatio Anatomica de Motu Cordis et Sanguinis in Animalibus.* Here, for the first time in recorded history, a definite problem,dealing with an all-important function of the animal body, was attacked on the experimental side, under a definite and logical plan. The work is entirely modern in spirit, and is carried to an almost flawless conclusion.

It should be pointed out at the outset, to prevent misunderstanding, that Harvey did not discover that the blood *moved*—this was known to Aristotle and Galen—but he did discover why it moved and how it moved, and this at a time when the anatomists had not freed themselves from the domination of Galen. To appreciate fully Harvey's great contribution to physiology, and, indeed, to science generally, something should be known about the development of the notions current in regard to the movement of the blood and its function.

Aristotle considered the heart to be the central organ controlling the blood flow. It is the seat of vitality, the fount of the blood, the place where the blood is finally elaborated and imbued with animal heat. The blood is contained in the heart and vessels as in a vase, hence the term "vessel." He taught, farther, that the nutriment oozes through the walls of the bloodvessels and the various passages "like water in unbaked pottery," to use his apt comparison. Aristotle did not distinguish between arteries and veins. He calls them both "phlebes" (*Φλεβές*). The vena cava is the great vessel; the aorta, the smaller; and both contain blood. He did not use the term "arteria" for either of them. There is no movement of the blood from the heart to the vessels, in the sense of an obvious current, but the blood is continually being absorbed by the substance of the body, and as continually being renewed by absorption of the products of digestion, the mesenteric vessels taking up food much as plants take it up through their roots. The "pneuma" or "spiritus" is obtained from the lungs and is distributed to the heart by the pulmonary vessels, one to the right, and one to the left. The vessels in the lungs absorb the "pneuma" by mutual contact with the branches of the trachea. In Aristotle's view, the pulsation of the heart and vessels is a sort of ebullition by which the liquids are inflated by the vital heat. Cooling is brought about by the "pneuma," which is taken in by the lungs and brought to the heart. It is worth noting that the trachea is called *ἀρτηρία* (arteria) both by Aristotle and Hippocrates. It is the *air-tube* carrying the breath through the lungs.

Coming now to the Alexandrines, one of the leading representatives of their school, Praxagoras, discovered that it is the arteries that pulsate, but he was responsible for the great error that the veins only contain blood; the arteries, air. Observing that the arteries after death are usually empty, Praxagoras concluded that during life they are filled with an aeriform fluid, a kind of pneuma, to which the pulsation is due. Consequently, the word "arteria," already applied to the trachea as an air-containing tube, became attached to the arteries. The trachea, on account of its rough and uneven surface, was called *ἀρτηρία τραχεῖα* (arteria tracheia), that is the "rough air-tube." The French still call it "trachée-artère. Another great Alexandrine, Erasistratus, still farther elaborated the doctrine of the "pneuma," one form of which, he thought, comes from the inspired air, passes to the left side of the heart, and is distributed to the arteries. This is the cause of the heart-beat and the source of the innate heat of the body. It maintains the processes of digestion and nutrition. Erasistratus called it the "vital spirit". The other, the "animal spirit," is manufactured in the brain, chiefly in the ventricles, and is carried by the nerves to all parts of the body, thus endowing the animal with life and motion and perception. Thus, a fundamental distinction was made early between two sets of organs and two corresponding sets of functions. The vascular system, comprising the heart, vessels, and abdominal organs, is governed by the vital spirit; in the nervous system is elaborated the animal spirit, which controls motion and the general and special senses.

These teachings went almost unquestioned until well into the eighteenth century. Even now, we sometimes speak of "high" and "low" spirits; when we do we unconsciously reflect the views of the great Alexandrine.

Galen, four or five hundred years later, knew much about the movement of the heart, the pulsation of the arteries, and the action of the valves. He refuted by experiment the error that the arteries contain air and not blood. He tied a cord above and below a length of artery in the living animal and, cutting out the section, found, of course, that blood and not air was present inside.

Galen's conception ran something like this. There are two kinds of blood. One of these,

contained in the venous system, is dark and thick, and serves for the general nutrition of the body. This system starts from the liver, the central organ of nutrition and sanguification. From the portal system the products of digestion are absorbed from the stomach and bowels. From the liver come the venæ cavæ; one supplying the head and arms, the other the lower extremities. Springing from the right side of the heart is a branch corresponding to the pulmonary artery, which carries the blood to the lungs. This is the closed venous system. There is another, the arterial system, containing a thinner, brighter, and warmer blood, characterized by an abundance of vital spirits. Warmed in the ventricles it distributes the vital heat to all parts of the body. Both systems are closed, and communicate with each other *only through pores or perforations in the septum of the heart.*

One can hardly understand how Galen failed to discover the *circulation* of the blood. He knew that the pulsatile force is inherent in the walls of the heart; he knew that the systole drives blood out from, and that the diastole sucks blood into, the cavities of the heart; he knew that the valves of the heart determine the direction by which the blood enters and leaves the organ. But he seems to have been obsessed with the idea that the heart is a "fireplace," from which is derived the innate heat of the body. He did not grasp, evidently, that, instead, it is a "pump" for driving and distributing the blood. "How the body became such a "fiery dragon," as Sir Clifford Allbutt phrased it, is sufficiently remarkable, and was never explained His notion seems to have been that there is a sort of tidal movement in both systems, and yet, curiously enough, he sometimes makes use of expressions, in speaking of the venous system, singularly like ours. He calls it "..... a conduit full of blood, with a multitude of canals large and small running out from it and distributing blood to all parts of the body." The method of nutrition he compares to irrigating canals and gardens, with a wonderful dispensation of nature that they should lack "neither a sufficient quantity of blood for absorption, nor be overloaded at any time with an excessive supply.

Galen's views held sway, with all the weight of authority, until the time of Harvey. One step was made in advance, however, by Michael Servetus in 1553, when he described very accurately the lesser circulation in the lungs, in his *Christianismi Restitutio.* His immortal fellow-student Vesalius apparently was unaware of his work, for he accepted, at least at first (1543), Galen's dictum as to the porosity of the cardiac septum. That Vesalius had his doubts, however, is indicated in the second edition of his De Fabrica (1555), where he states that, in spite of the authority of the Prince of Physicians, he cannot see how the smallest quantity of blood can pass through so dense a muscular partition. It is singular how tenacious of life this doctrine of the porosity of the septum was, for many years after, we find Harvey assuring Professor Riolanus, of Paris, who had his scruples, that "if only you will pour water into the right heart, and tie all vessels going to and from the lungs, not one drop will get into the left ventricle."

Like Servetus, Colombo, also, believed in a lesser pulmonary circulation, but was so far astray as to deny that the heart is a muscular organ.

Finally, Cesalpinus, for whom has been claimed by his countrymen the honour of the discovery of the circulation of the blood before Harvey, is considered by Osler to be a simple Galenist. Cesalpinus believed, like all his contemporaries, that the blood was distributed through the body, for its nourishment, by the vena cava and its branches. But, to discuss the merits of the controversy would lead us too far afield.

And now William Harvey comes upon the stage.

WILLIAM HARVEY*

BY HERMANN M. ROBERTSON, C.B.E., M.D., C.M., M.R.C.S. (ENG.), F.R.C.S. (EDIN.), L.R.C.P. (LOND.), F.A.C.S.

Victoria

William Harvey the discoverer of the circulation of the blood, was born on April 1, 1578, at Folkestone, and died at Roehampton June 3, 1657. His preliminary education was probably carried on in Folkestone, where he learned the rudiments of knowledge and gained his first acquaintance with Latin. He went to the King's School, Canterbury, for five years, no doubt going home for the holidays, some of which must have been spent in watching the constant transport of troops to Spain and Portugal, which was so noticeable a feature of the Cinque Ports during the latter years of the life of Queen Elizabeth. His schooling ended, Harvey entered at once, as an ordinary student, at Caius College, Cambridge.

The choice of this College seems to show that he was already destined by his father to follow the medical profession. His habits of minute observation, his fondness for dissection, and his love of comparative anatomy, had probably shown the bias of his mind from his earliest years.

Dr. Caius, in addition to his knowledge of Greek, may have been said to have introduced the study of practical anatomy into England. His influence obtained for the College the grant of a charter in the sixth year of the reign of Queen Elizabeth, by which the Master and Fellows were allowed to take annually the bodies of two criminals condemned to death and executed in Cambridge or its castle, free of all charges, to be used for the purposes of dissection. Unfortunately, no record has been kept as to the

*An address delivered before the Victoria Medical Society on May 18th, 1928, on the occasion of the Harvey Tercentenary Celebration.

use which the College made of this privilege, nor is there any means of ascertaining whether Harvey did more than follow the ordinary course pursued by students until he graduated as a Bachelor of Arts in 1597. His education, in all probability, had been wholly general thus far, consisting of a sound knowledge of Greek, a very thorough acquaintance with Latin, and some learning in dialectics and physics.

He now began his more strictly professional studies, and the year after he had taken his Arts degree at Cambridge found him travelling from France and Germany towards Italy, where he was to study the sciences more nearly akin to medicine, as well as medicine itself.

Harvey was attracted to Padua, and many reasons probably influenced him in his choice. The university was specially renowned for its anatomical school, rendered famous by the labours of Vesalius, the first and greatest of modern anatomists, and the work of his successor, Fabricius, one of the most honoured and learned teachers of his day. Caius had lectured on Greek in Padua, and some connection between his college at Cambridge and his old University may still have been maintained. The fame of Fabricius and his school was no doubt the chief reason which led Harvey to Padua, but there was an additional reason which caused his friends cheerfully to concur in his resolve. Padua was the university town of Venice, and the tolerance which it enjoyed under the protection of the great commercial republic rendered it a much safer place of residence for a Protestant than any of the German universities or any of its fellows in Italy.

Fabricius was more than a teacher to Harvey, for a fast friendship seems to have sprung up between master and pupil. At this time a man of sixty-one years (he died at the age of eighty-two), he was engaged during Harvey's residence in Padua in perfecting his knowledge of the valves of the veins. The valves had been known and described by Sylvius (1478-1555), that old miser who warmed himself in the depth of a Parisian winter by playing ball against the wall of his room rather than be at the expense of a fire. The work of Sylvius had fallen into oblivion, but Fabricius rediscovered the valves in 1574. His observations were not published until 1603, when they appeared in a small treatise—*De venarum ostiolis*. There is no doubt that he demonstrated their existence to his class, and Harvey knew of the treatise, though it was published a year after his return to England.

Now, when we consider Harvey's work, it all appears to be a continuation and an amplification of that done by Fabricius. Both were intensely interested in the phenomena of development; both wrote upon the structure and function of the skin; both studied the anatomy of heart, lungs and blood vessels, and both wrote a treatise *de motu locali*. Harvey's youth, his comparative freedom from the trammels of authority, and his more logical mind, enabled him to outstrip his master and to avoid the errors into which he had fallen. This advance is particularly well seen in connection with the valves of the veins. Fabricius taught that their purpose was to prevent over-distension of the vessels when the blood passed from the larger into the smaller veins (a double error), whilst they were not needed in the arteries because the blood was always in a state of ebb and flow. It was left to Harvey to point out their true use, and to indicate their importance as an anatomical proof of the circulation of the blood.

Harvey graduated as Doctor of Medicine at Padua in 1602, and the eulogistic terms in which his diploma is couched leave no doubt that his abilities had made a deep impression upon the minds of his teachers. The diploma was presented to the College of Physicians of London on Sept. 30th, 1766, and is dated April 25th, 1602. It further states that he conducted himself so wonderfully in the examination, and had shown such skill, memory and learning, that he had far surpassed even the great hopes which his examiners had formed of him.

Armed with so splendid a testimonial, Harvey must have returned at once to England, for he obtained the degree of Doctor of Medicine from the University of Cambridge in the same year, when it appears also, that he took a house in London, in the parish of St. Martin's, and lost no time in attaching himself to the College of Physicians. This body had the sole right of licensing physicians to practice in London and within seven miles of the city, and he was admitted a licentiate of the College on October 5, 1604. A few weeks after this he married Elizabeth Browne, daughter of Dr. Lancelot Browne, physician to Queen Elizabeth and to James I. Dr. Browne died the year following his daughter's marriage. Harvey's union was childless, and we know nothing of Mrs. Harvey, except that she died before her husband.

On June 5, 1607, Harvey was elected a Fellow of the College of Physicians, and immediately attached himself to St. Bartholomew's Hospital.

Until the year 1745 the teaching of anatomy in England was vested in a few corporate bodies, and private teaching was discouraged in every possible way, even by fine and imprisonment. The College of Physicians and the Barber-Surgeons' Company had a monopoly of the anatomical teaching in London. Subjects were difficult to procure, and dissecting came to be looked upon as part of the legal process so inseparably connected with the death penalty for crime that it was almost impossible to obtain even a body of a "stranger" for anatomical purposes. The executions in London were witnessed by great crowds, who often sided with the friends of the felons and rendered it impossible for the body to be taken away for dissection. A Charter of James I enlarged their powers by allowing the College of Physicians to take annually the bodies of six felons executed in London, Middlesex or Surrey.

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Little is known in detail of the manner in which Anatomy was taught by the College of Physicians, but it appears to have been carried out practically in a series of demonstrations upon a body. As there was no means of preserving a subject it had to be by a general survey, rather then in detail. A single body was dissected to show the muscles (this was the muscular lecture); another to show the bones (the osteological lecture); another to show the parts within the head, chest and abdomen (the visceral lecture). The lecturer for the various parts was not always the same, though great teachers, like Reid and Harvey, gave a course upon each subject.

The Lumleian Lecture was on Surgery, established at a cost of forty pounds by two notable men, Lord Lumley in Essex, and Dr. Caldwell in Derbyshire. The lecturer was appointed for life, and its subjects were so arranged that they recurred in cycles.

Harvey, in all probability, began to lecture at once upon surgery as the more theoretical portion of his subject, but it was not until April, 1616, that he gave his first anatomical lecture. It was a visceral lecture for the terms of the bequest required that it should be upon the inward parts. He was only thirty-seven years of age at this time, a man of the lowest stature, round-faced. His eyes were small, round, and very black; his hair as black as a raven and curling; his utterance was rapid and he was given to gesture. When discoursing with anyone he unconsciously played with the handle of a small dagger he wore by his side.

The manuscript of Harvey's first course of lectures is now in the British Museum. The notes of his visceral lecture are of especial value to us, though they are a mere skeleton of the course. Fortunately, they deal with the thorax and its contents, so that they show us the exact point which he had reached in connection with his great discovery of the blood and the true function of the heart. Harvey was so good a Latin scholar, and during his stay in Italy had acquired such a perfect colloquial knowledge of the language, that it is clear that he thought with equal facility in Latin or in English. He used many abbreviations, and whole sentences are written in a mixture of Latin and English. The first set of notes deal with the outside of the body, and the abdomen and its contents; the second portion contains an account of the chest and its contents; whilst the third portion is devoted to a consideration of the head with the brain and its nerves.

After a full discussion of the situation and functions of the various parts of the abdominal viscera, he passes on to the thorax and enunciates his memorable discovery in these remarkable words,

> "It is plain from the structure of the heart that the blood is passed continuously through the lungs to the aorta as by the two clacks of a water bellows to raise water. It is shown by the application of a ligature that the passage of the blood is from the arteries into the veins. Whence it follows that the movement of the blood is constantly *in a circle*, and is brought about by the beat of the heart. It is a question therefore whether this is for the sake of nourishment or rather for the preservation of the blood and the limbs by the communication of heat, the blood cooled by warming the limbs being in turn warmed by the heart."

Here the notes on the heart end abruptly, and Harvey passes on to consider the lungs. These few sentences, however, show that he had discovered the circulation, and that though he delayed for twelve years to make his results public he was unable to add any important fact in the interval. The College of Physicians still preserve an interesting memorial of this portion of Harvey's Lumleian Lectures. It consists in a series of six dissections of the blood vessels and nerves of the human body, which are traditionally reported to have been made by Harvey himself. The dissections are displayed upon six boards, the size of the human body, and they exhibit the complete system of the blood vessels separated from the other parts so as to form diagrams of the circulatory apparatus. They have been made with such care that one of the series still shows the semilunar valves at the beginning of the aorta.

Harvey continued his Lumleian Lectures year by year, but we know nothing more of them until 1627, when he delivered a series of lectures upon the anatomy and physiology of the human body, more especially of the arm and leg, with a description of the veins, arteries and nerves of these parts.

On February 3, 1618, Harvey was appointed Physician-Extraordinary to James I., or, in the language of his time, "The King, as a mark of his singular favour, granted him leave to consult with his ordinary physicians as to his Majesty's health," and at the same time he promised him the post of a Physician-in-Ordinary, so soon as one should become vacant. This promise he was unable to fulfill, but it was redeemed by his son, Charles I., who appointed Harvey a Physician-in-Ordinary in 1631 and remained his friend through life.

Besides being physician to the household of the king, he seems to have held similar positions in the households of some of the most distinguished nobles and men of eminence. In the year 1613 he was elected a Censor in the College of Physicians. The Censors were four Fellows of the College appointed annually, "with power to supervise, watch, correct, and govern" those who practised physic in London or within the statutory seven miles, whether members of the College or not. They were empowered to visit the shops of the apothecaries to "search, survey, and prove whether the medicines, wares, drugs, or any thing or things, whatsoever such shops contained and belonging to the art and mystery of an apothecary be wholesome, meet and fit for the cure, health and ease of his Majesty's subjects."

On December 23, 1627, he was appointed to the still more important office of the "Elect." The "Elects" were eight in number. They

were chosen from the most cunning and expert of men of the faculty of London. It was their duty, once a year, to select one of their number to fill the office of President, to appoint a Board of Examiners for those who desired to practise physic throughout England. These examinations were conducted at the house of the President, where on December 9, 1629, Harvey examined and approved Dr. James Primrose, Professor of Anatomy of Paris, who soon became the most malignant opponent of his teaching.

Early in 1633 Harvey received the commands of Charles I. to attend him on his journey to Scotland. Charles' tour in Scotland was fraught with the most momentous consequences, both to himself and to his kingdom. Harvey must have been in close attendance upon the King during the whole of his stay, but he probably interested himself very little in the proceedings of the Court, or in the hot discussions between the rival sects around him. We know, indeed, that he was thinking about the method by which a chick is formed within the egg, and that to solve the point he paid a visit to the Bass Rock.

The year 1645 marks the period of Harvey's severance from the Court. and of his practical retirement from public life. He was now 68; a martyr to gout, childless, and suffering under a series of heavy bereavements, and he can have had little heart to re-enter upon an active professional life in London. Harvey returned to London after the surrender of Oxford, and he was succeeded as reader of the anatomical lectures by Dr. Scarborough, who was elected on October 8, 1649, by the company of Barber-Surgeons of London. Dr. Scarborough was knighted on August 15, 1669, and his friendship with Harvey commenced at Oxford and continued unabated until the end of his patron's life; and when, on July 28, 1656, Harvey presented to the College of Physicians the title-deeds of his paternal estate in Kent and resigned his Lumleian lectureship, the office was transferred to Charles Scarborough. In his will Harvey makes affectionate mention of his friend, and bequeaths to him his surgical instruments and his velvet gown, so that literally, as well as metaphorically, Harvey's mantle fell upon Sir Charles Scarborough, and he nobly sustained the charge, great as it was.

Dr. Ent has left a striking picture of the old man at Christmas, 1650, nearly a year after the execution of the King. He states that "Harvey lived not far from the city, where he found him busy with the study of natural things, his countenance cheerful, his mind serene, embracing all within its sphere. Our Harvey rather seems as though discovery were natural, a matter of ordinary business; though he may nevertheless have expended infinite labour and study on his works. And we have evidence of his singular candour in this, that he never hostilely attacks any previous writer, but ever courteously sets down and comments upon the opinions of each."

This account brings home to us the charm of Harvey's personality. Beloved by his family and honoured by the College of Physicians, the old man went to his grave amidst the genuine grief of all who knew him. The publication of his essay on Development in 1651 was almost his last literary effort. His love for the College of Physicians remained unabated. and he gave proof of it in a most practical manner, as he was the means of procuring a library and a repository for simples and rarities for the College, and before it was completed the College voted that a statue of Harvey should be placed in their hall. This was accordingly erected and represented Harvey in the cap and gown of his degree, and, though it perished in the Great Fire of London in 1666, it was not replaced when the College was rebuilt on or near its old site in the more recent building in Pall Mall.

Harvey died at Roehampton on June 3, 1657. Aubrey says that on the morning of his death, about 10 o'clock, he tried to speak and found that he had a "dead palsy" in his tongue; then he realised what was to become of him. He knew there were no hopes of his recovery.

It would appear that Harvey died of a cerebral hæmorrhage from vessels long injured by gout, and situated rather at the base or internal parts of the brain than in the frontal lobes. Most probably the left Sylvian artery gave way, leading at first to a slight extravasation of blood, which rapidly increased in quantity until it overwhelmed his brain.

Harvey's *liber aureus* is certainly his *Exercitatio anatomica de motu cordis et sanguinis in animalibus*. The work was issued from the press of William Fitzer, of Frankfort, in the year 1628. Harvey chose Frankfort as the place of publication for his book because the annual book fair held in the town enabled a knowledge of his work to be more rapidly spread than if it had been issued in England.

The treatise opens with a dedication to Charles I. couched in fitting emblematical language, and signed:—"Your Most August Majesty's Most Devoted Servant, William Harvey."

In the preface he excuses himself for the book, saying that he had already and repeatedly presented to them his new views of the movement and function of the heart in his anatomical lectures.

The anatomical treatise gives in seventeen short chapters a perfectly clear and connected account of the action of the heart and of the movement of the blood round the body in a circle. A movement which had been foreshadowed by some of the earlier anatomists and had been clearly indicated by Harvey himself as early as 1616. Harvey's proof fell short of complete demonstration for he had no means of showing how the smallest arteries are connected with the smallest veins. He worked, indeed, with a simple lens, but its magnifiying power was too feeble to show him the arterioles and the venules, whilst the idea of an injection does not seem to have occurred to him. It was not

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until after the invention of the compound microscope that Leeuwenhoek, in 1675, described the blood vessels, though they had already been seen by Malpighi.

The first chapter of the treatise is introductory. It is a review of the chief theories which had been held as to the uses of the heart and lungs. It had been maintained that the heart was the great centre for the production of heat. The blood was driven alternately to and from the heart, being sucked into it during the diastole, and driven from it during the systole. The use of the arteries was to fan and cool the blood, as the lungs fanned and cooled the heart, for the pulse was due to an active dilatation and contraction of the arteries. During their dilatation the arteries sucked in air, and during their contraction they discharged murky vapours through pores in the flesh and skin.

Harvey begins his chapter on the Movement of the Heart and Blood with the clear statement that the heart must be examined whilst it is alive; but he says—"I found the task so truly arduous and so full of difficulties that I was almost tempted to think with Fracastorius that the movement of the heart was only to be comprehended by God. For I could neither rightly perceive at first when the systole and when the diastole took place, nor when and where dilatation and contraction occurred, by reason of the rapidity of the movement, which in many animals is accomplished in the twinkling of an eye, coming and going like a flash of lightning."

After disproving the erroneous views of the heart's action, Harvey next proceeds to discuss the movements in the arteries as they are seen in the dissection of living animals. He shows that the pulsation of the arteries depends directly upon the contraction of the left ventricle and is due to it, whilst the contraction of the right ventricle propels its charge of blood into the pulmonary artery, which is distended simultaneously with the other arteries of the body. These facts enabled Harvey to disprove the current theory that the heart's systole corresponded with the contraction of the arteries, which then became filled with blood by a process of active dilatation, as bellows are filled with air.

The broad points in connection with the vascular system being thus settled, Harvey turned his attention more particularly to the mechanism of the heart's action. He shows that the two auricles move synchronously and that the two ventricles also contract at the same time. Hitherto it had been supposed that each cavity of the heart moved independently, so that every cardiac cycle consisted of four distinct movements. The minute accuracy of Harvey's observation is shown by his record of what is in reality a perfusion experiment. He says—"Experimenting with a pigeon upon one occasion after the heart had wholly ceased to pulsate and the auricles too had become motionless, I kept my finger wetted with saliva and warm for a short time upon the heart and noticed that under the influence of this fomentation it recovered new strength and life, so that both ventricles and auricles pulsated, contracting and relaxing alternately, recalled as it were from death to life."

We now know that this was due to warmth, to the moisture, and to the alkalinity of Harvey's saliva, so that he performed crudely, and no doubt by accident, one of the most modern experiments to show that the heart, under suitable conditions, has the power of recovering from fatigue.

Harvey formulates in his fifth chapter the conclusions to which he had been led about the movement, action and use of the heart. His results appear to be absolutely correct by the light of our present knowledge, and they show how much can be done by a careful observer, even though he be unassisted by any instrument of precision. He further states:—

"The great cause of doubt and error appears to me to have been the intimate connection between the heart and the lungs. When men saw both the pulmonary veins losing themselves in the lungs, of course it became a puzzle to them to know how or by what means the right ventricle should distribute the blood to the body or the left draw it from the venæ cavæ . . . . ." Furthermore he said:—

"Had anatomists only been as conversant with the dissection of the lower animals as they were with that of the human body, the matters that have hitherto kept them in a perplexity of doubt would, in my opinion, have met them freed from every kind of difficulty."

After this plea for the employment of comparative anatomy to elucidate human anatomy, Harvey proceeds to deal in a logical manner with the various difficulties in following the course taken by the blood in passing from the vena cava to the arteries, or from the right to the left side of the heart.

It is a matter of historical knowledge that Harvey's views regarding the circulation of the blood were not accepted in toto. The exact teaching of his contemporaries in London is easily accessible. One of his distinguished colleagues at the College of Physicians was Alexander Reid (born in 1586), who learnt surgery in France, was admitted to the College of Physicians in 1624, and was appointed Lecturer on Anatomy at the Barber-Surgeons' Hall, December 28, 1628, in succession to Dr. Andrewes, Harvey's assistant. For some reason Harvey's doctrines did not recommend themselves to Reid, and his Manual therefore contains the following traditional account of the heart:—

"As for the heart, the substance of it is compact and firm, and full of fibres of all sorts. The upper part is called Basis or Caput: the lower Conus Mucro or Apex Cordis. When the heart contracteth itself it is longer, and so the point is drawn from the head of it. But when it dilateth itself it becometh rounder, the conus being drawn to the basis. About the basis is the fat. It is covered with a skin which hardly can be separated. In moist and cowardly creatures, it is biggest..... Of all parts of the body it is hottest, for it is the well-spring

of life, and by arteries communicateth it to the rest of the body. The heart hath two motions, Diastole and Systole. In Diastole, or dilatation of the heart, the conus is drawn from the basis to draw blood by the cava to the right ventricle, and air by the arteria venosa (pulmonary vein) to the left ventricle. In Systole or contraction the conus is drawn to the basis."

However, the year 1628 may fairly be looked upon as the crowning year of Harvey's scientific life. It was that in which he published at Frankfort-on-the-Main his matured account of the circulation of the blood. After its publication he was sometimes heard to say that "he fel mightily in his practice," for it was believed by the vulgar that he was crack-brained, and all the physicians were against him. But he lived to see his grand discovery universally accepted and inculcated as a canon in most of the medical schools of Europe; and he is said by Hobbs to have been "the only one who conquered envy in his lifetime and saw his new doctrine everywhere established."

The writer has quoted freely from "Masters of Medicine" by D'Arcy Power, F.S.A., F.R.C.S., Eng., written in 1897.

Association Notes

THE ANNUAL MEETING: AN IMPRESSION

"Broad sweep of uplands close on either hand
Green upon green—a thicket here and there,
Hedging the red roads winding slowly down
By checkered fields and meadows lush with grass
To where in misty blue above the town
Soft lights and colours tremble as they pass."

This thumb-nail sketch by an Island writer fairly describes a visitor's first impression of Prince Edward Island, and, travel over the Province as he may, he is never out of sight of just such a picture; and June makes cleaner and fresher, if that were possible, the face of nature here outlined. In the fifty-nine years of the history of the Canadian Medical Association this in the first in which a general meeting has been held in the smallest Province of all—itself the cradle of Confederation.

Many feared that a meeting so large as this would swamp a meeting place so small, but industry and preparation on the part of the local profession and of the executive of the Canadian Medical Association overcame all obstacles and brought to pass a meeting which will stand unique in the annals of the Association.

Whoever received the inspiration which caused the chartering of a steamship which would sail from Montreal and act as a floating hotel for its passengers during their stay in Charlottetown was the one who assured the success of the meeting, for, aside from easing the strain upon the local accommodation, the voyage down the river and gulf made and cemented friendships among far-removed members of the Association, which generated a homogeneous nucleus for the whole gathering and became the guarantee of a successful meeting.

Many cities of Canada have greeted the Association with open-handed hospitality, but seldom in the memory of the most blasé has a welcome to the body been so spontaneous and wholehearted. It can readily be seen that all the medical men in a city of 12,000, or in a Province of 88,000 people, if they worked all the time, could not alone take care of a registration of 560 delegates, but they had enlisted the enthusiastic co-operation of all the citizens, and the members and their friends had thus actually bestowed upon them the Freedom of the Province. It was indeed difficult to keep pace with the entertainment which was provided.

Very wisely, it would appear in this instance, the Executive arranged that the medical program would be carried out in general meetings only. A roll-call would have discovered but few absentees from the sessions, and the papers as a rule were chosen with a view to their general interest, and maintained a high average of quality.

It is impossible to eat one's cake and have it too, and it would not be fair to expect from papers planned for their general adaptability any records of detailed interest to men working in special fields, but in succeeding meetings to be held in larger centres the Committee would be well-advised to consider an appeal to the interest in more advanced subjects, while by no means ignoring the review of general questions. Leaving aside, however, all questions of strictly medical interest, the bringing together of more than five hundred intelligent Canadians for a common purpose, and showing to them a part of their national heritage which they had not seen before, is in itself a matter of no small importance for themselves, for each other, and for the peace and unity of Canada.

A. H. GORDON

The following letter, which is self-explanatory, has been sent to the *Journal* for publication:

MY DEAR DR. ROUTLEY:

Many thanks for your kind letter telling me of the honour the Association has done me by electing me a senior honorary member of the Association. As a past President and one of its early members I have always taken a great interest in the Canadian Medical Association and am glad to hear how prosperous it is.

Hoping you will let the members know how proud I am of the honour conferred, I am,

Sincerely yours,

F. J. SHEPHERD

Montreal, July 11, 1928.

Provincial Association Notes

THE BRITISH COLUMBIA MEDICAL ASSOCIATION

The annual meeting of the British Columbia Medical Association was held at Victoria on June 11th and 12th. The Empress Hotel was the headquarters for the meeting. Owing to the strenuous efforts of the Victoria Medical Society, and especially the organizing committee under the chairmanship of Dr. M. W. Thomas, this year's meeting was a great success, preparations having been made for entertainment as well as the presentation of scientific papers and transaction of the business of the Association.

Several members brought their wives to Victoria and these were delightfully entertained. A golf tournament was organized, and Drs. Lachlan MacMillan and C. H. Vrooman of Vancouver, were the successful players, though the latter was considerably impoverished in the matter of balls owing to the somewhat unique hazards encountered on the Oak Bay Golf Course.

Three of the members of the post-graduate tour, Drs. F. A. C. Scrimger, V.C., F. H. MacKay, and Andrew Hunter gave lectures on both of the days during which the meeting was held. These were fully up to the standard that they set in the meeting of the Vancouver Summer School.

On Tuesday morning a meeting of the Executive was held with twelve members present. Dr. W. S. Turnbull, President of the Vancouver Medical Association, was also present at the meeting and spoke on the suggested closer co-operation between the Vancouver and the British Columbia Medical Associations. This was one of the most important matters taken up at the meeting, and it was strongly felt by the Executive that the time had arrived for a more business-like arrangement, from the point of view of both Associations, to reduce expenditures and to increase the efficiency of the services given to the profession. A very full discussion took place and every member of the Executive supported the idea that no stone should be left unturned to bring the two Associations closer together, even if this meant some sacrifice on both sides. The question of details it was felt had to be left for future arrangement, but it was decided to recommend to the full meeting that the British Columbia Medical Association endorse the principle of a closer co-operation and this suggestion was whole-heartedly accepted by the later meeting of the full Association. At the meeting of the Association held in the evening reports were given by the chairmen of the various committees. The Industrial Service Committee presented a remarkably full and complete report, and showed a tremendous amount of work done by the business office of the British Columbia Medical Association. Contracts, Indian Department work, grants to medical men, payment of accounts, and the supplying of medical men both as locum tenentes and as permanent residents in various parts of the province, were referred to, and it could be seen in many instances how essential it is to the profession in British Columbia that there should be a strong central office keeping close watch on the hundred and one difficult problems that come up from day to day. Work has been done in regard to the Provincial Income Tax, and on the question of Coroners' fees, though this matter has not yet been satisfactorily settled. The question of Marine Hospital and Medical Services, which has been taken up by the Canadian Medical Association, was referred to this Association for a report and Dr. C. W. Prowd's report on the matter has been published among the reports of the Federal Organization.

In the matter of the Indian Department an additional $50,000 per year has been given by the Dominion Government, to be applied to medical services in this province, and in this matter our Executive Secretary has done a tremendous amount of work of great value to the Indian Commissioner at Victoria, Mr. Ditchburn. The Auditor's report showed a decrease in expenditures over last year of $623; a slight increase in membership; and a balance on the credit side, which is satisfactory in that it is neither too big nor too small.

The question of Health Insurance was taken up at this meeting and it was decided to appoint a committee to go fully into the matter immediately and keep the members in touch with the situation as it develops.

Eleven new members, as under, were approved and accepted: Edwin Johnston Curtis; Arthur George Elvin; William Elliott Harrison; John Allan Ireland; Thomas Campbell Michie; F. P. McNamee; Arthur Percival Proctor; Walter Scott Turnbull; Andrew Russell Wilson; Charles Arthur Watson; Lionel B. Wrinch.

The following officers were unanimously elected for the ensuing year: President; Dr. Wallace Wilson, Vancouver; President-Elect, Dr. W. A. Clarke, New Westminster; Vice-President, Dr. Theo. H. Lennie, Vancouver; Secretary-Treasurer, Dr. G. Lyall Hodgins, Vancouver; three members of the Executive at large, Dr. J. McKee, Courtenay; Dr. A. L. Jones, Revelstoke; Dr. R. McCaffrey, Chilliwack. The retiring President, Dr. H. E. Ridewood, spoke on the work of the association and thanked the members of the executive for the splendid work they had done.

THE ONTARIO NEURO-PSYCHIATRIC ASSOCIATION

The Spring Meeting of the Ontario Neuro-Psychiatric Association was held at the Westminster Psychopathic Hospital, London, Ontario, on June 11th.

The meeting was called to order at 3 p.m. by the President, Dr. R. G. Armour. Dr. McLean, Acting Superintendent of Westminster Psychopathic Hospital, gave an address of welcome to the members of the Association. The President then gave an interesting address on the work that is being carried on in the Ontario Hospitals.

Dr. Armour dealt with the progressive spirit that is prevalent in the hospitals, some of which can be appreciated by the program of the day. He also made a plea for larger medical staffs in the Ontario hospitals, which might allow of more investigation into physical problems as well as psychiatric phenomena.

Dr. R. Fletcher, Toronto, read a paper, "Report of work done at the Ontario Hospital, Toronto, with special reference to Sulfoxyl Salvarsan and non-specific protein."

Dr. Fletcher had been using large doses of typhoid vaccine as a non-specific protein, and had had some encouraging results in cases where the arsenical preparations could not be used. The percentages of improvements and cures in connection with general paresis is gradually climbing, some statistics passing from the thirties into forty-odd per cent. There could be no doubt that the old feeling that nothing can be done for any paretic is passing away.

Discussion was opened by Dr. Crawford, Psychopathic Hospital, Toronto, and continued by Dr. Fisher, London.

Dr. C. H. Pratt, Ontario Hospital, Woodstock, then read a paper, "The treatment of epilepsy," and showed some very interesting lantern slides illustrating the use of luminal and belladonna in its treatment.

Dr. Pratt's work on epilepsy is outstanding. His report contained records of exact numbers of convulsive attacks in institutional cases over periods of two to three years, and his methods were bringing under control cases that resist the older methods of treatment. By using large doses of caffeine and belladonna, the latter in doses of twenty or more minims of the tincture three times a day, he was able to increase the dose of luminal to as much as nine grains a day without any untoward effects. It was interesting to see his patients, a half to one hour after one of these large doses of belladonna, with small and active pupils and no dryness of the mouth.

Discussion was opened by Dr. McCausland, Kingston, and continued by Drs. Nichol, London; Cumberland, Woodstock; Catheart, Ottawa; Tennant, London; and Armour, Toronto.

The meeting adjourned at 5.40, and refreshments were served in the Nurses' Home, where the members were entertained by Dr. and Mrs. McLean and the Staff of the Westminster Hospital.

The evening session was called to order at 7.15 p.m. by the President.

Dr. Lynch, Brockville, read a paper, "Intensive use of bromides in the treatment of functional psychosis."

Dr. Lynch is using as much as three hundred grains of bromides a day. He finds the sodium salt the least irritating. An example of how he administers the drug would be, one hundred and fifty grains at eight o'clock in the morning, and seventy-five grains at four o'clock in the afternoon. Sometimes this is given merely dissolved in a cup of tea. Toxic effects were observed in the first few cases that were allowed to remain in bed, but by keeping the patient up and about, particularly after the larger dose, this effect was avoided. Less trouble was experienced from rashes with these larger doses than with the more conservative amounts in common use. Indications as to what was being obtained in many different types of patients, manic-depressives, in dementia præcox, and involutional psychoses, were the correction or relinquishing of delusions, calming of agitation, lessened bed-wetting and other soiling, and a generally more peaceful ward.

The discussion was opened by Dr. G. C. Kidd, Kingston, and continued by Drs. Robinson and Chalk of London; McLean, London; Pratt, Woodstock; Towers, London; Cumberland, Woodstock; Catheart, Ottawa, and McCausland, Kingston.

A Round Table Conference was called to order at 8.25 p.m. and many matters of importance were discussed. The meeting adjourned at 9.30 p.m.

From time to time a journal of the proceedings of this association is published by the Department of the Provincial Secretary and distributed to the members of the profession throughout the province. It will always be found worth while reading. Members of the profession generally will always be welcome at the meetings of this association in the different places in which it meets; its aim being to form a link between the general practitioner and the psychiatrist.

"Truth is an immortal and eternal thing. It bestows, not a beauty which time will wither, nor a boldness of which the sentence of a judge can deprive us, but the knowledge of what is just and lawful, distinguishing from them, and confuting what is unjust."
—*Epictetus.*

Reports of Societies

WESTERN NOVA SCOTIA MEDICAL SOCIETY

The annual meeting of the Western Counties Branch of the Medical Society of Nova Scotia was held at Yarmouth on the twenty-ninth of May. Dr. Elliott P. Joslin, of Boston, was present, and contributed an important address. There was a very large attendance.

In order to facilitate matters, the first day's session was devoted entirely to the reading and discussion of papers, and all business matters were left over to an adjourned meeting held on June eleventh.

The first paper was by Dr. A. R. Campbell, of Yarmouth, on "Surgical Diseases of the Testicle." Dr. Campbell outlined the signs and symptoms of the various surgical conditions of the testicle together with the differential diagnosis. He explained that perhaps no other organ excepting the breast suffered from errors in diagnosis more than did the testicle. He sketched the histological formation and the early pathological conditions which are met with. He explained the development of the testicle and outlined Stinach and Voronoff's treatments for rejuvenation. Dr. Campbell explained the treatment for tuberculous epididymitis and the differences between this and other lesions involving the epididymus and testis proper.

The second paper was by Dr. Elliott P. Joslin, of the New England Deaconess' Hospital, Boston, and was entitled "The Care and Treatment of Diabetics." Dr. Joslin outlined the procedure which he followed at the Deaconess' Hospital, stressing particularly the necessity of attention to minute details in diabetic patients and watching for early complications and anticipating them. This he emphasized particularly in the care of the lower extremities. Dr. Joslin explained how he treated diabetic gangrene, and laid special stress on the use of insulin in all surgical conditions. Diabetes in children was particularly considered. Before insulin was discovered this was a hopeless condition. but since its introduction it has changed the picture and gives new life to children so afflicted. He further showed how he administered insulin, using different places for each injection. The difference between the coma of diabetes and hypoglycæmia was explained.

At the adjourned session, Dr. Farrish was again in the chair. It was decided that the Society, having already agreed that the annual meeting of the Medical Society of Nova Scotia should be held at Charlottetown, were now willing to agree to any re-arrangement that met with the endorsement of the other branch societies.

It was moved and seconded that this society go on record as heartily endorsing the program put forward by the Nova Scotia Tuberculosis Commission.

The report of the Secretary-Treasurer was read and adopted.

The election of the officers for the coming year resulted as follows: President, Dr. J. E.LeBlanc, West Pubnico; Vice-Presidents, Dr. L. M. Morton, for Yarmouth Co.; Dr. P. L. Belliveau, for Digby Co.; Dr. H. H. Banks, for Shelburne Co.; Secretary-Treasurer, Dr. Thomas A. Lebbetter, Yarmouth; representatives on the Nova Scotia Medical Society Executive, Dr. G. W. T. Farrish, Dr. W. C. O'Brien.

It was moved and seconded that the Society send a letter of condolence to the family of the late Dr. A. J. Fuller.

Dr. Lebbetter was appointed to represent the Society on the "Osler Memorial Fund" Committee.

T. A. LEBBETTER,
Secretary-Treasurer

The Physician—There are men and classes of men who stand above the common herd, the soldier, the sailor, the shepherd not infrequently; the artist rarely; the physician almost as a rule. He is the flower of our civilization, and when the stage of man is done and only to be marvelled at in history, he will be thought to have shared as little as any in the defects of the period and most nobly exhibited virtues of the race. Generosity he has, such as is possible to those that practice an art, never to those who drive a trade. Discretion, tested by a hundred secrets, tact tried in a thousand embarrassments and, what are more important, Herculean cheerfulness and courage.—Robert Louis Stevenson.

"There are two methods of obtaining knowledge—by argument and by experiment; argument makes conclusions and forces us to agree to them, but it does not make us feel certain or so remove suspicion that the mind rests in assurance of truth, unless this be also found by experience."—*Roger Bacon, Opus Majus*, Pars VI, cap. I.

"Thou mayest always speed, if thou wilt but make choice of the right way; if in the course both of thine opinions and actions, thou wilt observe a true method."—*Marcus Aurelius.*

Correspondence

The Edinburgh Letter

(From our own correspondent)

An interesting side-light on the expedients of the Voluntary Hospital System is obtained once a year on "Infirmary Day." On that particular occasion, the activities of a week's endeavour to raise money in support of the Infirmary come to a climax. Battalions of collectors in every variety of fancy costume are let loose upon the city. These parade the streets, encamp upon doorsteps, enter shops, hotels, street cars, and restaurants, and even invade the inner sanctuaries of clubs. The ordinary citizen on his way to the office may expect to have a fresh money-box rattled under his nose at every few yards. As often as he appears in the street, so often may he expect to be importuned, solicited and finally effectively fleeced. The man in the street may be permitted to speculate on the practicability of an arrangement that allows highwaymen to thrust pistols in his face, permits Red Indians to threaten him with tomahawks, and sanctions Samoan natives brandishing menacing clubs over his head. It may be that the voluntary hospital system is on its last legs, if so there was no sign of its being doomed at this year's Infirmary day. The collectors by a series of hold-ups gathered more money than ever before. The culminating point was reached when a pageant about two miles long paraded the principal streets. This consisted of numerous pipe and brass bands, a series of tableaux on motor lorries, and the appearance of representatives of every branch of the community, fishermen, firemen, coalminers, shepherds in procession. The proceedings terminated in a student carnival in the Waverley Market, which was opened by Sir John Gilmour, Lord Rector of Edinburgh University, and Principal Sir Alfred Ewing.

In the end of May, Sir W. Leslie Mackenzie retired from his post as medical member of the Scottish Board of Health. Sir Leslie is proceeding to Kentucky. He has accepted an invitation to inaugurate a new hospital service which has been formed in the mountainous districts of the Alleghany region. This medical scheme has been modelled on a plan, similar to the services in the Highlands and Islands of Scotland, for the conception of which Sir Leslie was so largely responsible. Sir Leslie is to be accompanied by Lady Mackenzie, who has always taken a lively interest in Public Health matters in Scotland. The choice of Sir Leslie to inaugurate this scheme is a tribute to his success as an administrator, and would appear to be an acknowledgement of the success of the Highlands and Islands Service.

The University Court, on the recommendation of the Senatus, has approved a revised scheme of the curriculum of courses for the University Diploma in Tropical Medicine and Hygiene. This new course has been devised to meet the requirements particularly of officers of the Colonial Medical Services. The University of Edinburgh has been specially recognized by H. M. Colonial Office, as an institution in which these officers may pursue the study of tropical medicine, either on first appointment or on special leave of absence during their service.

The Annual Golf Match between the Royal Colleges of Physicians and Surgeons was played on May 21st over New Luffness Course, and resulted in a win for the Surgeons by 18 matches to 1. Certainly the Surgeons have taken summary vengeance for the Physicians' victory in the curling match last March.

The Harveian Festival was held in the Royal College of Physicians on June 1st. This event has taken place annually since 1787, when the club was founded by Dr. Andrew Duncan (senior) to commemorate William Harvey. Dr. Robert Thin, President of the Edinburgh Harveian Society occupied the Chair, and treated a large gathering to an interesting address upon Archibald Pitcairn in relationship to Harvey. This medical scientist, in addition to being a poet and man of letters, was an ardent Jacobite politician. Largely as a result of his work in connection with Harvey's discoveries, Pitcairn was appointed Professor of Medicine at Leyden. Returning to his native country he must be regarded as the real founder of the Edinburgh Medical School. After an eloquent and arresting address the society and its guests dined in the Hall of the College.

Dr. F. A. E. Crew, M.D., D.Sc., Ph.D., has been appointed by the Court of the University of Edinburgh to be Professor of Animal Genetics and Director of the University Department of Research in Animal Breeding. The Chair is to be known as the Buchanan Chair of Animal Genetics. It was founded by a donation from Lord Woolavington, supplemented by a grant from the International Education Board, New York. Professor Crew, the first occupant of the Chair, is a graduate of Edinburgh University. In 1920 he was appointed Director of the newly created Animal Breeding Research Department. In 1927 Dr. Crew was William Withering Lecturer at the University of Birmingham, and in 1928 Milroy Lecturer at the Royal College of Physicians, London. Several books dealing with his subject have been published over his name. These include "Animal Genetics," "Genetics of

Sexuality in Animals," "Organic Inheritance in Man," and "Heredity"; also he has written many scientific papers. In addition to his purely scientific pursuits, Professor Crew is Commanding Officer of the Medical Unit of the University O.T.C.

Edinburgh has sustained a sad loss through the death of Sir James Hodsdon, K.B.E., F.R.C.S., on May 28th. For many years he took a prominent part in the medical life of the city. Born in Bermuda in 1858, he graduated M.D. at Queen's University, Belfast. In 1883 he obtained the Fellowship of the Royal College of Surgeons, and ultimately became President of the College during the stirring years of 1914 to 1917. He has represented his College since 1906 on the General Medical Council. During the War he did valuable work on the Staff of the 2nd Scottish General Hospital, the Emergency Committee, and on various Appeal and Pension Boards. As a hospital surgeon, a teacher and administrator, his work was of merit and importance. His death comes as a great personal sorrow to those with whom he was associated in these and other capacities.

GEORGE GIBSON

23, Cluny Terrace, Edinburgh.

THE PRODUCTION OF A NEW TUMOUR

To the Editor:

I have read with much interest the paper of Dr. Brebner in your issue of April, 1928, p. 397.

There are, however, some erroneous statements made in regard to the literature, to which it is necessary I should call attention.

The statement is made that "Warburg (*Biochem. Zeit.*, 1923, cxlii, 317) had shown that tumour and placenta are comparable metabolically, in that they both have a high ærobic and anærobic glycolytic activity."

This is wrong. The paper, to which reference is made, contains neither the word "placenta" nor any synonymous term. Negelein, working in Warburg's laboratory later, examined the maternal mucosa and the fused amnion and chorion, as we believe, but not the invading chorionic epithelium, and found no such metabolic result as that which Dr. Brebner ascribes to Warburg. Indeed, Warburg has stated that placenta (presumably meaning chorionic epithelium) does *not* behave like malignant tissue.

As a matter of fact, Murphy and Hawkins (*Journ. Gen. Physiol.*, 1925, viii, 115), working with Warburg's method, were the first to show that the "placenta" behaves like malignant tissue in respect of ærobic glucolysis; but doubtless they were acquainted with our work and views, previously published, regarding the malignant nature of the chorionic epithelium.

We ourselves (*Brit. M. J.*, 1926, i, 687; *Idem.*, 1928, i, 126; and *J. Obst. & Gynæc. Brit. Emp.*, 1928, xxxv, 233), have demonstrated that the chorionic epithelium possesses the power of ærobic glucolysis, and we have fully discussed the whole subject. Loeser, also, (*Centralb. f. Gynäk.*, 1926, 1, 1819), has published some inconclusive evidence on the same subject.

There is no doubt, however, that we have been the first definitely to demonstrate from every point of view that the chorionic epithelium is a malignant tissue, and to base our work on malignant disease on our findings in this respect.

I wonder whether Dr. Brebner can obtain tumours without using chick embryo as well as placental tissue, for our own attempts to produce malignant tumours from chorionic transplants have not so far given positive results.

W. BLAIR BELL

Liverpool, England, June 14, 1928.

ON THE DIAGNOSIS OF HYPERTENSION

To the Editor:

As a diagnosis of hypertension seems to be rather prevalent these days, it seems to me there should be some unanimity among medical men as to what should be told patients about their blood pressure.

Personally I find elderly people, who have consulted a doctor while away on a visit, or have gone to a different climate for the winter, return with a definite figure of their blood pressure reading, always the systolic. They come regularly afterwards to have their blood pressure taken, and demand to know the figure, which, unfortunately for their own peace of mind, is usually not much reduced. They are aware that high blood pressure may be a forerunner of apoplexy, and they spend the remaining years of their life in dread of an impending calamity.

This worry may do as much towards keeping the blood pressure high as our treatment in getting it reduced. Before the days of the sphygmomanometer old folks spent their last days happy and content, unaware that they were on the brink of a precipice. Now they know their danger, and even if we prolong their life a year or two by proper treatment, they know that we are not getting them far away from the edge of the precipice.

Instead of diagnosing high blood pressure as a disease and telling patients how high it is, if we went farther, and tried to find the cause of the hypertension, treated our patients for the cause, kept track of the blood pressure, systolic and diastolic, as an aid in prognosis and treatment, we would be doing our patients a kindness. We would also relieve ourselves of the necessity of explaining to them that a sudden drop in blood pressure would be a greater calamity than if it remained stationary.

My purpose in writing is to try and get some

helpful discussion on this question. You might bring it before the readers of the *Journal* in some way so that a fairly unanimous opinion may be reached as to whether or not it is better to tell patients how high their blood pressure is.

Yours sincerely,

W. A. CHESTNUT

Moosomin, Sask.
June 25, 1928.

P.S.—If you think it is better to tell them I am willing to fall in line. W.A.C.

FOUR CENTURIES OF MEDICAL HISTORY IN CANADA

This letter, which is self-explanatory, has been sent by the writer to the *Journal* for publication, with the concurrence of Dr. Heagerty. Dr. Heagerty's statement on the matter appears also. (ED.)

Dr. J. J. Heagerty,
Department of Health, Canada,
Ottawa, Ontario.

Dear Dr. Heagerty:

When the announcement of your book, "Four Centuries of Medical History in Canada," arrived I immediately sent for a copy and have read it with great interest. At the request of the editor I have reviewed the work for *The Canadian Nurse*, the official organ of the Canadian Nurses Association. May I congratulate you very heartily on the historical value of your book. The story of the founding of the first hospitals in Canada deserves to be published to the world and in your volumes that story has been well told.

When one realizes the immense amount of time and labour expended by you in the preparation of this work, the sifting over multitudinous documents in the Dominion Archives and elsewhere it seems almost ungracious to interject a word or two of adverse criticism. Coming from the position you occupy, however, your book has an authority which might be lacking had it been written only by one of the rank and file of the profession. The criticism is this that, no doubt inadvertently, there has been insufficient recognition of the achievements of the west and when the merits of the east have been lauded as they are that thereby an injustice has been done to Western Canada and its institutions.

May I state my points. Part 5 of the book deals with medical schools. On page 56, volume ii, occur these words. "In 1903 the University of Saskatchewan offered a partial course in medicine, and in 1906 the University of Alberta did likewise. In the year 1910 there were eight medical schools in Canada. These were studied by the Carnegie Foundation for the Advancement of Teaching, a report of the study being published on April 16th of that year. Each school was visited and the findings approved by two or more independent observers. While some of the schools were unequivocally condemned for lack of equipment and hospital teaching facilities, others, notably Toronto and McGill, received well merited praise." Then followed extracts from the report dealing with these two schools. The next paragraph continuing, "Since that report was made both Toronto and McGill have made further progress which places them in the ranks of the foremost medical schools of the continent. The course in Canadian universities is now a six-year one."

While no one will deny that Toronto and McGill rank deservedly with the leading medical schools of this continent, it is only in accordance with the facts to point out that since 1923 the Medical Faculties of both Manitoba and Alberta Universities have received Class A, the highest, rating. The Education Number for the *Journal of the Americal Medical Association*, August 16, 1924, gives the rating of all medical schools in the United States and Canada. In the list of Canadian schools Alberta and Manitoba are shown as Class A along with Toronto and McGill. In 1923 the University of Alberta offered a complete medical course and already two or three classes have been graduated from that institution.

To my mind it does seem unfair to Manitoba and Alberta to make reference in a work published in 1928 only to the 1910 report of the Carnegie Foundation and not to quote from subsequent reports.

Part 6 of your work deals with Hospitalization. On page 192, volume ii, under the heading Toronto General Hospital occur these words. "The hospital is proud of the record and reputation of its Nurses Training School, which in 1926 graduated 84 nurses, being the largest class ever graduated from a Canadian hospital." The class of nurses graduating in 1925 from the Training School of the Winnipeg General Hospital numbered 95, and the class graduating in 1928 numbered 96.

As evidence of the achievements in medical history in Western Canada may I point out the following.

A psychopathic hospital was built on the grounds of the Winnipeg General Hospital in 1919, the first to be established in Canada.

In 1910 the first Social Service Department in connection with a Canadian hospital was inaugurated at the Winnipeg General Hospital.

In January, 1921, a prenatal clinic was organized at the Winnipeg General Hospital and in April, 1927, a post-natal clinic.

Manitoba led the way among the other provinces in the establishment of District Health Nurses by the late Hon. Dr. J. W. Armstrong, vide *Canadian Medical Association Journal*, vol. xviii, No. 4, April, 1928, p. 475.

May I also point out that in vol. ii, page 285, the name of the superintendent of Brandon

XUM

Mental Hospital should be Dr. C. A. Baragar, and not Barragher as printed.

In closing may I add that the foregoing criticism is not made in any spirit of sectionalism. Osler warned us against Chauvinism and that is a warning which Canada with its immense distances and sparse population particularly needs to heed. It is only because I have a great admiration for the services you have rendered to the cause of medical history in Canada that I wish in all kindness to point out the seeming inaccuracies or lack of proportion in your book, which may be corrected in a later edition.

Will you kindly accept the gratitude of a Canadian physician.

Yours sincerely,

ROSS MITCHELL

To the Editor:

I wish to thank Dr. Mitchell for his letter of appreciation of "Four Centuries of Medical History in Canada" and to acknowledge my indebtedness to him for pointing out certain omissions and apparent lack of proportion in those chapters treating of the West and the Province of Manitoba in particular.

The lack of proportion to which Dr. Mitchell makes reference is more apparent than real. It is self-evident that the records of institutions which have been in existence for a period of three hundred years or more, such as those of the East, will of necessity contain more historical material than institutions that have come into existence within the past few years, such as those of the West. Eastern institutions, on account of their age, offer more in the way of historical material than those of the West, and to them, therefore, more space has been afforded.

I am sure that the readers of "Four Centuries of Medical History in Canada" will appreciate the impossibility of doing full justice to each and every medical institution in Canada, of which there are hundreds, within the scope of two short volumes. When, in addition, one considers the tremendous amount of ground that was covered, the difficulty of eliciting every fact in connection with such institutions will be only too evident.

It is to be regretted that in the chapter on medical schools the impression was created that a comparison was made of the relative merits of existing schools. Such was not my intention. In writing so fully of McGill and Toronto, I wished only to give a word of well-merited praise to two of the oldest and foremost schools of Canada—two schools that compare favourably with the best anywhere.

A reference to the chapter on the University of Manitoba, which concludes with the following words:—

> "The University of Manitoba offers facilities for undergraduate medical training equal in all essentials to that of any Canadian school, and promises, as in the past, a steady advance in modern educational methods and continually widening opportunities for medical research,"

shows clearly that I was fully appreciative of the high professional standing of that school. Several visits to the western schools have convinced me of the great strides that are being made by those young institutions, and I fully realize that in respect of medical education the East will have to look to its laurels. If I have dwelt at greater length upon the older medical schools and institutions, it is because they offered more fertile ground for research, and to the student of history the older institutions make a more insistent appeal.

I am nevertheless fully seized of the importance of Dr. Mitchell's kindly and frank letter, which was so evidently written in a spirit of helpfulness, and I am grateful to him for the valuable suggestions he has made.

Yours very truly,

J. J. HEAGERTY

Ottawa, July 13, 1928.

"The physician should be of a tender disposition, of wise and gentle nature, and more especially an acute observer, capable of benefiting every one by accurate diagnosis, that is to say, by rapid deduction of the unknown from the known. And no physician can be of tender disposition if he fails to recognize the nobility of man; nor of philosophical nature unless he be strengthened by God's guidance; and he who is not an accurate observer will not arrive at a correct understanding of the cause of any ailment."—Nizami-i-Arudi, Court Poet of Samarcand.

"We ought to choose both a physician and a friend, not the most agreeable, but the most useful."—*Epictetus.*

"A wise man will hear, and will increase learning; and a man of understanding shall attain unto wise counsels."—*Proverbs of Solomon*, I, 5.

"It is the glory of God to conceal a thing; but the honour of kings is to search out a matter."—*Proverbs of Solomon*, XXV, 2.

Topics of Current Interest

POST-OPERATIVE TETANUS

The following abstract from the *British Medical Journal* (1928, i, 937,) is a digest of a report on post-operative tetanus by Dr. T. J. Mackie, Professor of Bacteriology, University of Edinburgh. The importance of the subject cannot be over-emphasized.

"The occurrence of a series of cases of post-operative tetanus in an institution led the Scottish Board of Health to request Dr. T. J. Mackie, Irvine Professor of Bacteriology in the University of Edinburgh, to investigate the matter. Since this infection has in the past been associated with catgut, Professor Mackie was asked at the same time to report also upon the effectiveness of the means employed for sterilization of catgut in its manufacture, storage, and use in hospital; the dangers attendant on its use in surgery; and the best available means for effective sterilization during manufacture, storage, and use in hospital. The report of this inquiry has now been published by the Stationery Office, at the very low price of 1s. Professor Mackie, who was assisted in the inquiry by Dr. G. S. M'Lachlan, lecturer in bacteriology at Edinburgh University, believes that the investigation has not only elicited data of the utmost significance in regard to the whole problem of post-operative tetanus, but has also led to an extended study of preventive methods which deserves the most careful attention. The Scottish Board of Health expresses its full agreement with Professor Mackie's assessment of the importance of the facts now published.

INCIDENCE AND ETIOLOGY

The report opens with references to the literature showing that post-operative tetanus has been commonly attributed to catgut, though cases have occurred in which this material was not employed, and auto-infection was incriminated. The valuable suggestion is proffered that information should be collected systematically regarding the incidence of post-operative tetanus in all the general hospitals in Great Britain, since at present it is probable that many cases are not published. It is well known that *B.tetani* occurs as a commensal organism in the alimentary canal of various herbivorous animals, including the sheep, from the intestines of which surgical catgut is prepared. Other anaerobic sporing bacilli capable of producing serious wound infections are also found in the intestine, and the conditions prevailing in abattoirs from which the raw material for making catgut is obtained render contamination very easy. Subsequent sterilization of the catgut is a particularly difficult matter owing to the resistant powers of the tetanus spores. Post-operative infections by other sporing bacilli have also been reported, and this emphasizes the difficulty of adequate sterilization of the catgut. During the period in which the cases of post-operative tetanus occurred at the institution in question, the surgical catgut employed was supplied almost entirely from one source, mostly in the form of "dry strings," which had already undergone some measure of sterilization but were subjected to further bactericidal treatment before being used in operations. During the investigation this supply of catgut was stopped.

CLINICAL DETAILS

Of the eleven cases of post-operative infection in the institution considered in the report one had occurred so long ago as 1923; in no instance was it possible to trace any connection between the catgut used for the various patients, and the operations in the more recent cases were separated by intervals of twelve, nineteen, nine, and seventeen days. The highly significant fact was elicited that in gynæcological repair operations a considerable amount of catgut remained embedded in the tissues; it was estimated by one surgeon that approximately 69 inches might be so left after a repair operation for complete prolapse of the uterus. Moreover, in such operations it is a common practice to employ the thicker gauges of gut. Though *B. tetani* was not always demonstrated, there was little doubt about the diagnosis in any of the patients in view of the clinical and pathological data.

In the whole series there were nine cases of definite tetanus, one of gas gangrene, and one of a sporing anærobe infection with muscular spasms. Ten different surgeons were concerned, and six operating theatres. All the patients died except one, in whom tetanus supervened after a repair operation for a retroverted uterus and a deficient perineum. The incubation period in this case was fourteen days, as contrasted with incubation periods of seven to twelve days in the fatal cases. The time of death after the onset of tetanus ranged from a few hours to five days. *B. tetani* was demonstrated in two cases, tetanus-like organisms were found in two, and other sporing organisms in two cases. No organisms were isolated in one case, and in two others no bacteriological examination was performed. Negative bacteriological findings are admittedly of little significance in the diagnosis of tetanus cases. Five of the nine cases occurred after operations in one theatre which was on the ground floor and close to a main corridor. Constructional work was proceeding in its neighbourhood, but no further evidence was obtained indicating that these local conditions were concerned in the infection. The possibility of auto-infection was carefully considered, but this

explanation had to be dismissed in the absence of data.

CONTAMINATED CATGUT AND TETANUS

Professor Mackie mentions that the preparation of the catgut included: (1) twelve hours' immersion in a watery solution of mercury biniodide; (2) heating at 160° C. for one hour in oil; (3) heating in anhydrous spirit in a Jellet's sterilizer in boiling water for one and a half hours; (4) storage in an antiseptic fluid containing a mixture of mercury biniodide and other antiseptics. The technique of the last three procedures was carefully reviewed, and no evidence was obtained of any carelessness or inexactitude. The dry catgut strings were tested, and were found to contain sporing anærobic bacilli of the group to which *B. tetani* belongs; these (*B. tetani* and *B. mesentericus*) were used for testing purposes, and it quickly became obvious that exposure for twelve hours to the watery solution of mercury biniodide could have but little effect. A certain proportion of the spores of *B. mesentericus* survived heating in oil at 160°, and the margin of the destruction of *B. tetani* was very narrow. The ineffectiveness in this respect of heating in a Jellett's sterilizer was completely demonstrated, and spores remained viable finally after storage in the mixed antiseptic solution. In only one procedure was *B. tetani* destroyed. Intermittent sterilization in heated oil was tried but was found to ruin the catgut, as did also streaming steam sterilization and exposure in an autoclave to superheated steam. The efficiency of very many chemical bactericides was tested; hydrogen peroxide and iodine water proved to be the best, but the action of some reputed bactericides was found to be surprisingly feeble. It was concluded finally that catgut "ribbons" could best be sterilized by immersion in hydrogen peroxide (10 vols.) for twelve hours, the catgut strings spun from these ribbons being further exposed for fourteen days in iodine water. These procedures, which do not damage the catgut, can be employed in factories; it is suggested that, subsequently, the strands should be passed through two changes of spirit to remove the iodine, and be stored in 50-75 per cent alcohol containing 0.1-0.2 per cent iodine. It is added that these processes should be controlled in operation by bacteriological examinations."

ENCEPHALITIS LETHARGICA

The insidious nature of encephalitis lethargica, the difficulty of diagnosis, the high death-rate of the disease, and the low proportion of cures effected are points emphasized in a report on this malady issued recently by the Ministry of Health, the work of Mr. Allan C. Parsons, M.R.C.S.

Among the points emphasized are:

"The disease is still a comparative novelty and its onset is often so insidious that it attracts no attention even from the patient himself.

"Since 1919 no fewer than 14,321 cases have been notified, and 6,477 deaths are registered as having been due to this cause.

"The proportion of those who recover from the acute attack sufficiently to pursue their usual occupation with little incapacity is only about 25 per cent."

Records show that a fatal ending to the disease is more frequent among patients who are attacked at the two extremes of life.

"There is probably no infectious or contagious disease in the country which produces so much consequent ill-health and disablement," the report adds.

"If the total number of those who are annually maimed by encephalitis lethargica is an insignificant proportion of the general population, the individual victims of this disease are often conspicuous by reason of their peculiar plight.

The wage-earning husband, known to his original employer as a capable and intelligent workman, who loses job after job and eventually drifts into a Poor Law institution or an asylum as a case of post-encephalitis is pitiable enough; equally disastrous to the home is it when the disease selects the housewife and so alters her character and outlook that, from being, perhaps, the intelligent mainstay of the home, she now becomes lethargic and melancholy, incapable of attending to her own needs, still less those of her husband and children.

The results of the disease on children are certainly peculiar and deplorable in many cases, and cause considerable anxiety where the child's education and even his whole future are at stake. There is something diabolically malign in an infection which can transform a studious, well-behaved, and popular schoolboy into a lazy, vicious little terror, not fit for the company of his school-mates, and quite beyond the control of his parents at home. Most pathetic of all, perhaps, is the dribbling 'old man of 15 or so, who sits hunched up in his chair, stiff and impassive, slowly dying of Parkinsonism.'

Existing measures are not altogether sufficient or suitable for many of the patients left seriously disabled, and it is held that the proper repositories for adult patients who develop mania are the certified mental hospitals. Juvenile patients placed in reformatories and industrial schools are wont to impose a great strain on the staffs.

It is also difficult to find refuges for the 'troublesome and incorrigible children of older age,' who, while they do not come in conflict with the law, are a source of anxiety and distraction to relatives. For a small minority of sufferers the vigorous regime of prison life for a time has been found to be the best form of treatment.

There is at present no specific or efficacious remedy for encephalitis lethargica." (Recent Report of the Ministry of Health, London, Eng.)

INHERITANCE OF MENTAL DEFECT

The following letter of inquiry and the answer thereto are taken from the *British Medical Journal*, 1928, i, 823.

Sir,—Any editorial pronouncement in the *British Medical Journal* of necessity carries such weight that I am tempted to invite your attention to the annotation in your issue of April 21st (p. 680) on sterilization of the feeble-minded in Alberta, where this sentence occurs: "Scarcely any fact is more securely established than that it is only a small, almost negligible, minority of mentally defective persons who are the offspring of parents themselves certifiably mentally defective." On the other hand, I read in a paper on heredity of feeble-mindedness by H. H. Goddard, Vineland, N.J. (reprinted from the *Eugenics Review*, April, 1911), with regard to one single family, "Since this was written this family has been further investigated, with the result that we now know the facts concerning 319 members, of whom 119 are feeble-minded, with only 42 known to be normal." Can you assist me in reconciling the two statements.—I am, etc.,

D. S. DAVIES, M.D.

The two statements to which Dr. Davies directs attention are not contradictory. It is true that where both parents are mentally defective the offspring are almost certainly mentally defective also, and that even where one parent only is mentally defective, some of the offspring are likely to show the same characteristics. Nevertheless, it is true also that in any generation only a small proportion of mental defectives are the children of parents who themselves are certifiably mentally defective, the overwhelmingly larger proportion being the children of apparently normal parents, of "carriers" who themselves are normal, or of those who suffer from mental or nervous instability or from psychoneuroses or a mild degree of mental abnormality not certifiable. It follows that, for the purpose of eradicating or preventing the spread of mental deficiency, the sterilization of a small number of feeble-minded persons would be ineffective. Attention may be again directed to the pamphlet on *Sterilization and Mental Deficiency* published by the Central Association for Mental Welfare.

AVERTIN

In a recent lecture,* on the trend of thought in the art of therapeutics, Dr. W. E. Dixon described a new type of general anæsthetic. This was a tribrom-ethyl alcohol, known by the trade name of "avertin," the action of which had been determined precisely by Straub.

"It was a solid substance which at body temperature dissolved only to about 3 per cent in water, but if more concentrated solutions were required it could be employed in a suspended form. To produce general anæsthesia in a patient weighing 11 stone about 10 grams of this substance was administered per rectum; this was rapidly absorbed—indeed, considerably more rapidly than water or saline solution—and the patient was anæsthetized and ready for the surgeon within ten minutes. With this anæsthetic operations had been performed lasting two hours or more without pain or any subsequent discomfort to the patient, and a considerable clinical literature was already available. At first, accidents happened after using it, but since the mechanism of its action had been better understood these had entirely disappeared. The drug after absorption acted on the central nervous system like the commoner anæsthetics, but within a few hours it was completely broken up in the body, the bromine being converted to sodium bromide. With an anæsthetic dose of 10 grams about 11 grams of sodium bromide was produced, and such an amount led to sleep lasting, perhaps, for thirty-six hours after the operation had been completed. The proportion of bromide excreted depended upon the amount of sodium chloride in the blood, and varied with it; it was well known that under normal conditions when the chloride was constant the excretion of bromide was very slow, and, after a single dose, could be detected in the urine for several days. It was a simple matter, however, to get rid of this excess. In the case under consideration after the operation had been completed the excess of bromide should be eliminated by increasing the excretion of chlorides; this was effectively achieved by injecting from 5 to 10 grams of common salt, suitably diluted, into the rectum. One objectionable feature of this form of anæsthesia, as indeed of other forms of anæsthesia, was the production of some degree of acidosis. To combat this it was advisable to dose the patient before operation with sodium bicarbonate. The great advantages of this method of producing anæsthesia were obvious. The ease and certainty of producing the desired effect in a short time and for a long period, the absence of discomfort during administration, and the general comfort of the patient for several hours after the operation was completed, were some of them."

* *Brit. M. J.*, 1928, i, 896.

NARCOTIC PLANTS

In the appropriate setting of the old Physic Garden at Chelsea on June 7th, Dr. W. E. Dixon, F.R.S., Reader in Pharmacology at the University of Cambridge, delivered a Chadwick Lecture on the subject of narcotic plants. It was an interesting discourse on the various specimens (in the green leaf) which were on the table in front of him, and was lighted up by a genial philosophy. One of Dr. Dixon's observations was the curious fact that all over the world the national beverages

containing caffeine were dependent upon plants without any characteristic smell or taste. Of all the alkaloids, he said, caffeine was the most widely used by man. It was found in the leaves and beans of the coffee tree, in tea, and also, in small quantities, in cocoa. It might be said that tea, coffee, and cocoa were not narcotics, but that was because they were not taken in large enough quantities. People of all races seemed to crave for something which exerted on the brain a mild narcotic influence. This craving might be understood among highly civilized peoples, accustomed to work or play at high pressure and subject to the strain of modern life. In such circumstances anything might be seized upon which prevented the exercise for the time of the higher faculties of the mind; but why should the primitive people in Northern India smoke Indian hemp, which also produced a narcotic effect on the nervous system? To some extent it was explained, as was the taking of opium, as a social function. The natives sat round in a ring and practised this indulgence, passing into a state of languid ease, obtaining an exalted sense of their own superiority, and losing their relationship to time and space, so that the minute became an hour. Such was the result which followed the use of the essential oils exuding from certain plants. Often these oils were closely allied, though the plants producing them were very different. Who would imagine that attar of roses, eucalyptus, and turpentine had much in common? Yet when any of these was taken by the mouth the person taking it smelt of roses. In the days of imperial Rome the maidens used regularly to take a drop of turpentine so that the fragrance of the queen of flowers might cling about them. Another essential oil of very powerful properties was exuded from the nutmeg, and in the early days of tea drinking in this country the nutmeg grater was an accessory to the teapot, a little of the aromatic kernel being used to give a fillip to the tea. But, of course, the outstanding example of the narcotic plant is tobacco, whose innocent leaf Dr. Dixon exhibited to his audience. Incidentally, he said, it was a fortunate thing that we did smoke tobacco and not eat it or inject it. This led him on to the generalization that in all these matters, so long as we kept away from the chemist, we were tolerably safe. Who ever heard of the juice of the vine doing any serious harm until the chemist came on the scene and practised his distillations? With opium, again, the great mischief was not done until the chemist came along and extracted its chief narcotic principle, morphine, and offered the hypodermic needle. In the same way, when tobacco was used for smoking it was relatively harmless, although Dr. Dixon emphasized the evil effects of inhalation, pointing out how the CO fixed the hæmoglobin, and how even the non-smoker who had the misfortune to ride in a full-blast smoking carriage with the windows closed suffered with the guilty and had a certain percentage of his blood put out of action. But of nicotine it must be said that its effects were marvellous in that it seemed at the same time to soothe the irritability of the supersensitive and to stimulate the dull and apathetic. How to correlate those two actions was a task which must be left to others. On the general question of tobacco smoking and of narcotic indulgence Dr. Dixon remarked on the sad paradox that we seemed to get our chief pleasures in life by escaping out of life. But in smoking he thought there were some values not often considered—for example, the ritual of smoking, the lenitive effect of its rhythms, and the half-unconscious occupations it afforded.—*Brit. M. J.*, 1928, i, 1038.

MACALISTER LECTURE ON MEDICINE IN ART

The second annual lecture in memory of the late Sir John MacAlister, Secretary of the Royal Society of Medicine, was delivered at the London Temperance Hospital, under the auspices of the London Clinical Society, on June 7th, by Sir Berkeley Moynihan, Bt., President of the Royal College of Surgeons. It was a popular lecture to which nurses and a number of the lay public were admitted, and was on the subject of "Medicine in Art." Substantially it followed the lines of the lecture which Sir Berkeley Moynihan gave last autumn to the St. Pancras Division of the British Medical Associaion. He began with the gargoyles of Notre Dame and the "Lincoln imp," and showed what interest there was in the curious deformities, no doubt shaped direct from models by the mediæval sculptor, to those who viewed them with an eye trained in medicine. Incidentally, these figures often carried horns on the head, and there was also a horn on the head of the most majestic sculptured figure in the whole world—the figure of Moses by Michelangelo, so badly placed in the church of San Pietro in Vincoli at Rome that few people realized what a masterpiece it was. The horn on the top of the head of Moses was supposed to be due to a misreading of a passage in the Vulgate. The most famous of all gargoyles was to be seen in the church of Santa Maria Gloriosa at Venice, and was the subject of an exquisite passage by Ruskin, in which he lamented the leering wickedness, the extreme of debasement, which it protrayed. But when Charcot visited this church and saw the gargoyle he said at once that it was exactly the kind of hystero-epileptic familiar to the Salpêtrière. The hystero-epileptic was considered in the Middle Ages and earlier to be the victim of "possession," and the image of him was put especially on the roofs and towers of sacred buildings to suggest that evil spirits had been driven out of the church. Another deformity familiar to very ancient artists was evidently achondroplasia; witness the representations of the great god Ptah of Egypt and Bes of Memphis —the large-headed goggly-eyed dwarf, with the short arms, the gross body, and heavy buttocks. Sir Berkeley Moynihan touched on the repre-

sentation of diseased persons in some of the great pictures by Raphael and others, and of the emotional expressions in the works of Velasquez, and he made the general remark that often some quite inferior artists, whose names were scarcely known to all, were far more correct in their details of subjects suffering from disease or deformity than were the great masters, obviously because the former stuck more closely to their models. He confessed that of all the pictures he had ever seen in Continental galleries the one which fascinated him most, and the one which he most coveted, was "The contemplation of St. Jerome" in the Louvre. The Louvre authorities were said to have refused to allow this picture to be photographed, but a 100-franc note and the promise of another produced the photograph which he exhibited to the audience; it conveyed, however, little or nothing of the power of the original. In showing some photographs of mediæval statuary, Sir Berkeley Moynihan said that it was the fashion to deride many antiques to-day from the point of view of anatomy, but he believed this view to be entirely mistaken, and he instanced to the contrary the "Dying Gladiator," which brought into play in a masterly manner the accessory muscles of respiration. He concluded with some ancient works of art representing primitive surgical operations, and mentioned that the first representation of a surgical operation in a work of art in Europe—there were earlier examples in Egypt and in Asia—was a fresco at Pompeii.—*Brit. M. J.*, 1928, i, 1044.

OBSCURE DENTAL SEPSIS

To the onlooker in medicine few things have been more impressive in recent times than the awakening of medical interest in dental and tonsillar sepsis as factors in obscure systemic infections. That there has been a gradual change of attitude on the part of the family medical attendant towards his patients' teeth will scarcely be denied. How many doctors fifteen years ago thought of toxic absorption from a tooth socket when treating a case of sciatica or of unexplained pyrexia? In the early days of enlightenment pyorrhœa alveolaris was thought to be of prime importance; now it is apical sepsis that holds the centre of the stage, and the pulpless tooth—the "filled dead tooth"—is increasingly recognized as a menace to health. Bit by bit the evidence has been sought for, and pieced together, incriminating hidden dental sepsis as (to say the least) a predisposing cause of general disease. The fruits of the pioneer work of Dr. William Hunter have thus in the course of a few years become a commonplace of medical practice. In this advance radiography has been of inestimable value. It is true that there is still a good deal of controversy about the interpretation of the x-ray appearances round the apices of pulpless teeth, and that all dental surgeons are not yet agreed as to the treatment of such teeth; but with improved technique and growing attention to the subject knowledge is accumulating. Fresh light on the problem, leading to something in the nature of standardized procedure, may be expected in the near future if odontologists and radiologists and pathologists continue to work hand in hand; but it is all-important, we think, that physicians and surgeons and general practitioners should regard themselves as essential members of the team. That the ophthalmologist also is concerned in this matter was preached many years ago by Mr. William Lang, who had noted and reflected upon the close connection between some eye infections and dental sepsis; and at the congress last April of the Ophthalmological Society of the United Kingdom Mr. A. F. McCallan, when discussing the ocular changes observed in association with focal sepsis, reported that one in five of a consecutive series of private patients coming merely for refraction were found on radiographical examination to have apical abscesses. In short, as Dr. Patrick Watson-Williams wrote the other day, at the end of his paper on nasal and oral sepsis in the etiology of gastro-intestinal and pulmonary diseases, "in medicine there is but one field, which ever calls for team work."—*Brit. M. J.*, 1928, i, 1036.

"Let the first satisfying of appetite be always the measure to you of eating and drinking, and appetite itself the sauce and the pleasure. Thus, you will never take more food than is necessary, nor will you want cooks; and you will be contented with whatever drink falls in your way."—*Epictetus.*

"Crafty men contemn studies, simple men admire them, and wise men use them; for they teach not their own use; but that is a wisdom without them and above them, won by observation."—Lord Bacon.

XUM

Abstracts from Current Literature

MEDICINE

Vingt Années d'Expérience de l'Endocardite Infectieuse à Evolution Lente. (Twenty Years' Experience with Chronic Infectious Endocarditis). Syllaba, L., *Annales de Médécine,* 1928, xxiii, 430.

The malady studied and analyzed by Syllaba in this paper is characterized by a typical clinical evolution, by, frequently, positive blood cultures, and by a fatal issue. It was known to Osler in 1885, and was described by him under the name "chronic infectious endocarditis." It was separated from the other endocarditides, on bacteriological grounds, by Schottmüller in 1910.

Syllaba bases his conclusions on a very full study, over some years, of 46 cases, in 33 of which the clinical diagnosis was confirmed by autopsy. In 17 cases examined bacteriologically, 10 (59 per cent) showed streptococci in the blood. Commenting on the bacteriological findings, Syllaba considers that more stress should be laid on the clinical course and post-mortem findings. Chronic infectious endocarditis, in his opinion, is a septic condition, tending towards death; to be distinguished from a chronic benign endocarditis with bacteriæmia and without metastases, tending towards healing. The disease is of slow evolution. It may last weeks, months, or even a year or two. Fever may last weeks and may be intermittent. Its duration has no particular importance in the matter of diagnosis. The chief feature in the clinical picture is the repeated occurrence of emboli and metastases. In the presence of embolic manifestations a negative blood culture should have no weight.

The following points are of value in arriving at a correct diagnosis: (1) A history of one or more attacks of acute rheumatism, with the occasional development of signs of cryptogenic septicæmia, should suggest the possibility of chronic endocarditis; (2) The presence of severe anæmia with a sub-icteric tint of the skin (*café au lait*); (3) The appearance of a diastolic murmur, perhaps transitory, at the aortic or mitral orifice; (4) Hypertrophy of the spleen (usually present); (5) Cutaneous hæmorrhages; pemphigus, erythema, circumscribed and fleeting œdema: (6) Epistaxis, hæmoptysis, or hæmatemesis; (7) Pain in the thorax or abdomen (from infarction); (8) Pain in the limbs, most frequently periarticular; (9) Retinal hæmorrhages; (10) The sudden onset of aphonia with stridulous respirations; (11) Hæmaturia; (12) Cultures of the blood and urine; (13) Monocytosis in the blood with a deviation to the left of the nuclear index; (14) Gangrene of one of the extremities from arterial occlusion; (15) Hemiparesis, hemiplegia, fleeting aphasia, etc.

In spite of this imposing list of suggestive features the diagnosis will still sometimes be in doubt. The features detailed above are indications of the presence of a septicæmia; they do not necessarily indicate endocarditis. The final test comes in the daily careful observation of the clinical course. Changes in the heart function, occurring under observation, will be of paramount importance.

A. G. NICHOLLS

Two Cases of Hæmaturia Caused by Insulin Treatment. Laurence, R. D., and Hollins, A. S., *Brit. M. J.,* 1928, i, 977.

The production of hæmaturia by insulin treatment is rare enough to make it worthy of note. The authors give details of two such cases. The first was that of a youth of nineteen years, who developed mild diabetes in August, 1927, which was controlled by diet alone. On November 7th he developed tonsillitis and two days later was admitted to hospital in a precomatose condition. He received 120 units of insulin that day, which completely abolished the glycosuria and left only a trace of ketonuria. On the two following days he received 50 units a day, and on the second day hæmaturia was noticed. This lasted for 24 hours and reappeared three days later for one day. Insulin (evidently) was given all along and was finally discontinued in two weeks' time.

Apart from the blood, the urine showed no abnormality at any time and kidney function tests were normal. There was no complication other than a well-compensated mitral lesion, due to previous rheumatism, and no history of previous hæmaturia, either in himself or his family. The pharyngitis was almost better when the blood first appeared.

The second case was that of a boy of eighteen, a severe diabetic, who was admitted with severe ketosis, which cleared up with large doses of insulin. Obvious hæmaturia appeared on the sixth day of insulin treatment (25 and 18 units morning and evening) clearing off within the day. As in the first case, the renal tests were normal and no septic focus was discovered, nor any factor to account for the blood other than the insulin.

The authors can find reports of but seven other such cases. The only factor common to these seems to be that the hæmaturia appeared while large doses of insulin were being given.

it is pointed out, however, that more details are needed as regards the degree of ketonuria present, since it is known that ketone bodies are an irritant to the kidneys and the increased excretion caused by insulin might be responsible. In the two cases under consideration ketosis had been severe, but was practically absent at the time of the hæmaturia.

There seems to be no reason for thinking that the hæmaturia is any reason for discontinuing insulin, either temporarily or permanently.

H. E. MACDERMOT

Tod Infolge Bluttransfusion. (Death Following Blood Transfusion.) Biesenberger, H., *Wiener klin. Wchnschr.*, 1928, xli, 923.

The author states that the fatalities following blood transfusion, according to the reports given in the literature, were attributable to hæmolysis and agglutination. He reports a case in which neither occurred.

His patient was a female, aged 34 years, suffering from severe pernicious anæmia and a paralysis of the lower extremities due to myelitis. One hundred and fifty cubic centimetres of blood had been transfused, when the patient complained of sudden sharp stabbing pains over the heart. A preliminary pallor was quickly succeeded by severe cyanosis of the face, soon spreading over the whole body, together with a feeble pulse.

The transfusion was immediately discontinued, CO_2 was administered, as well as heart stimulants. In half an hour the patient had recovered sufficiently to be taken back to the ward. Then her condition again became serious; delirium set in, followed by coma. Death occurred in one hour from the beginning of symptoms, with all the signs of acute cardiac failure, including œdema of the lungs.

At the autopsy, in addition to the usual signs of pernicious anæmia and myelitis, an old stenosis and insufficiency of the mitral valve was found.

As a rule, the presence of an organic lesion of the heart is not regarded as a contra-indication to blood transfusion, but this case shows that there are exceptions. The severity of the heart lesion, the degree of compensation, and the accessory or accidental factors, in this case the pernicious anæmia, should be taken into account.

A. G. NICHOLLS

Shoe-Dye Poisoning. Aikman, J., *Am. J. Dis. Child.*, 1928, xxxv, 1038.

This is a report of three cases of poisoning by shoe-dye in children, who seem to have a susceptibility to its influence. The outstanding symptom in this type of poisoning is general cyanosis, which may be as extreme as it is in cardiac disease. It is accompanied by general weakness, headache, vomiting, and general prostration, the symptoms beginning in from one-half to several hours after the shoes are put on. The condition lasts only a few hours, but deaths have been reported by some observers.

The poisoning is caused by the dye applied to tan shoes to alter their colour. Absorption of the dye takes place through the unbroken skin, and is more apt to occur if the shoes are damp. Removal of the shoes causes decrease of the cyanosis, but it may last several hours longer. There is some doubt regarding the poisonous element in the shoe dye, but it is generally held that it is either the aniline, or the nitrobenzene, which is the solvent used for the dye. Both these are benzene derivatives of the coal-tar series, aniline being reduced from nitrobenzene.

The packages in which the dye is put up contain a caution not to use dyed shoes until twenty-four hours after they have been finished. In one of Dr. Aikman's cases, however, a boy of six years old, the shoes had been dyed four days before, and, though he improved after removal of the shoes, the cyanosis returned next day when the shoes were worn again. Another case is reported of a girl, aged nine, who showed a return of the poisoning when the shoes were worn nine days after the first attack.

The treatment consists of a thorough bath and a rest in bed. Dyed shoes should be well aired several days before being worn by children.

H. E. MACDERMOT

Gelatin in Medicine. Beal, G. D., and Neff, A., *J. Am. Pharm. Ass.*, 1928 vol. xvii.

The authors find that the first extensive use of gelatin was during the French Revolution, when the Government, backed by the Academy of Medicine, supplied gelatin soups to the poor. One manufacturer of gelatin named Gannal used his family for experimental feeding with gelatin, but after a time their health failed on their diet of gelatin and bread and water. It was Voit, however, in 1870, who first established the fact that gelatin always spares protein to some extent, but is less complete than protein.

Edible gelatin is prepared commercially by steam-cooking specially prepared bones or skin. The material is washed, then treated with lime for thirty days or more, re-washed, neutralized and heated in open vessels with steam coils. By this method the original protein, ossein or collagen, is broken down into gelatin. The solution is then concentrated, filtered and clarified.

Gelatin is used in medicine chiefly in connection with feeding. Its use in ice cream is practically universal, about 0.5 per cent is used to give the cream a smooth velvety texture. It lends itself also especially to making many attractive varieties of salads and desserts, which

is of considerable importance from the dietician's point of view.

H. E. MACDERMOT

SURGERY

Benign Prostatic Hypertrophy. Hunt, V. C., *Surg., Gynæc. & Obst.*, 1928, xlvi, 769.

The treatment of benign prostatic obstruction during recent years has led to the development of certain principles which have added to the reduction of the mortality rate and to the safety of surgical treatment, and these principles have been combined by the internist, urologist, and the surgeon.

The stresses and strains of life result in degenerative changes in the cardiovascular system. In prostatic obstruction the renal excretory mechanism is directly affected, resulting in renal insufficiency, but renal insufficiency may be otherwise organically impaired by other diseases of the cardiovascular system. Willius has concluded that the incidence of cardiovascular disease is higher with prostatic obstruction than with other diseases during the same decades, indicating that cardiovascular disease is aggravated by persistent urinary retention.

Adenomatous hypertrophy comprises about 85 per cent of benign obstructing lesions, the remainder being of an inflammatory nature. On rectal examination, prostatic fullness is encountered in 50 per cent of men fifty years of age, but the symptoms of obstruction are relatively rare at that age or under. A small gland may produce obstruction with complete retention, while, on the other hand, a huge gland may provide adequate urethral passage. It is the moderate-sized gland which is usually productive of retention, frequency and difficulty.

Cystoscopic examination is not recommended in all cases of prostatic obstruction. Braasch has followed the principle of cystoscopic examination in those cases in which observations on digital examination do not explain the symptoms. All cases should be given careful urological consideration, for too often normal prostate glands have been removed for symptoms higher up in the tract. Retention and residual urine, definitely due to the prostate, form the true indications for prostatectomy. The patient with prostatic obstruction is, as a rule, a poor subject for immediate operation, and the merits of preliminary treatment have been definitely established. Drainage of the bladder is of prime importance and cystostomy should give place to the permanent indwelling catheter, and should be continued until the cardiovascular-renal reserve has been restored to a period of safety. This period requires from ten to twelve days and is the method of choice, for it facilitates the one-stage visualized operation. Suprapubic drainage is necessary under the conditions of associated vesical lesions, such as stones and diverticula, and in those cases of marked renal insufficiency requiring long periods of drainage. The intolerance of the indwelling catheter also is an indication, but this occurs only in about 6 per cent of the patients.

The two-stage suprapubic prostatectomy is the procedure of choice under certain circumstances, but the one-stage visualized operation, preceded by catheter drainage, is gradually becoming preferred and, in the series studied, was the method adopted in 72 per cent of the cases. Regional anæsthesia has properly displaced general anæsthesia in this field of surgery, and minimizes post-operative renal depression and pulmonary complications. The accepted contra-indications to prostatectomy are, cardiac decompensation, coronary sclerosis with evidence of marked myocardial injury, and advanced malignant hypertension. The results of prostatectomy are very gratifying; about 85 per cent of the patients are completely, or almost completely, relieved of their symptoms.

The author, in summing up, emphasizes the fact that the case of benign prostatic obstruction is largely medical; a surgical condition is present, but there are aspects which may best be appreciated by the physician, and it is through the combined effort of the internist, urologist, and surgeon that the patient can be operated on with the minimal risk and assurance of the best functional result.

R. V. B. SHIER

The Diagnosis of Branchial Cyst. Bailey, H., *Brit. M. J.*, 1928, i, 940.

It is common to find a branchial cyst mistaken for necrosing tuberculous cervical glands, for branchial fluid, on being aspirated, looks exactly like tuberculous pus and brings forth on bacteriological examination a report in keeping with that of tuberculosis, namely: "No tubercle bacilli found; cultures sterile." In about 10 per cent of cases tubercle bacilli are found in tuberculous pus, but the author quotes a case in which a branchial cyst was removed showing the characteristic stratified squamous epithelium upon a basis of lymphoid tissue, while the fluid aspirated before operation showed numerous tubercle bacilli.

Caseating tuberculous glands are exceedingly common while branchial cyst is comparatively rare. Branchial cyst makes its first appearance in early adult life, curiously, with an abrupt onset, after which the cyst slowly increases in size. Recurrent attacks of inflammation are usual. The cysts are nearly always related to the upper third of the sterno-mastoid around the anterior border of the muscle. But as the muscle becomes thinned and flattened over the cyst this relationship is seldom clear until the muscle has been rendered taut. To confirm the

diagnosis of branchial cyst a little of the fluid is aspirated, a drop of aspirated fluid placed on a slide, the slide examined with a one-sixth power lens, and the presence of cholesterol crystals at once makes the diagnosis certain.

Branchial cysts should be completely removed by dissection. They often run deeply into the neck, and may extend upwards as far as the base of the skull. It is desirable to remove the cyst intact, for if the cyst bursts the dissection is difficult. The author believes that the following technique simplifies the operation: after carefully cleaning the superficial aspect about half the contents of the cyst are removed by aspiration, the puncture hole being covered with a piece of gauze; the gauze and cyst wall are then picked up with a pair of sponge-holding forceps, gentle traction is made in various directions, and the cyst wall is cleared by gauze and blunt dissection, aided here and there by some sharp dissection. Using these means the intact cyst may be completely enucleated.

R. V. B. SHIER

GYNÆCOLOGY AND OBSTETRICS

An Analysis of Thirty-Two Cases of Ectopic Pregnancy and Three Suspected Ectopic Pregnancies. Allen, E., *Am. J. Gynec. & Obst.*, 1928, xv, 540.

Anything which interferes with descent of the ovum, whether it be infection or infantilism, predisposes both to sterility and ectopic pregnancy. In this study, the average age of the patients was 30.8 years; and the percentage of relatively sterile cases in the series was 71.7.

Irregular bleeding or spotting was the most constant symptom noted, but in one-third of the cases there was no period of amenorrhœa. As a rule, the bleeding was not profuse and was often referred to by the patient as a normal period, until definite questions were put to her. Lancinating pain was not noted, but cramps in the lower abdomen, referred down the thigh, were present in 31 per cent. Seven-tenths of the cases showed a leucocytosis of 10-20,000, with a temperature range of 98° to 100° F.

Treatment consisted of a diagnostic curettage and colpotomy. If blood was obtained, and the tube was free, it was removed vaginally. The abdominal operation was advisable only when the pelvis was full of blood or the tube adherent. As a means of diagnosis in doubtful cases, the colpotomy incision was an invaluable aid.

ELEANOR PERCIVAL

Observations on Certain Features of the Pathology, Symptomatology, and Treatment of Retroversion. Cooke, W. R. *Am. J. Gynec. & Obst.*, 1928, xv, 493.

In a study of 1,153 cases of retroversion, occurring in the gynæcological service of the John Sealy Hospital, several observations of interest were made.

Retroversion causes a congestion of both the uterine and ovarian veins, producing a large, boggy uterus, which microscopically shows perivascular fibrosis in the myometrium and hyperplasia of the endometrium. This stage is characterized by menorrhagia. In cases of long-standing retroversion the menstrual interval becomes irregular, due to fibrosis of the ovaries, the flow being therefore irregular and profuse. In very advanced cases, the ovary becomes so fibrotic, that amenorrhœa may occur. The individual symptomatology depends on the balance between the uterine and ovarian dysfunction.

As regards fertility, patients with menorrhagia showed a decreased fertility, but once the ovum became embedded, abortion seldom occurred. Those with delayed interval were less fertile and were more apt to abort, since the vitality of the ovum was low.

So far as treatment is concerned, simple measures, such as the knee-chest posture, a pessary, etc., are indicated in puerperal retroversions, and they may be used as a test to see if the symptoms are relieved, before resorting to operative procedures. When operation is necessary, the technique used is that of sewing the lower anterior surface of the uterus (well below the fundus) to the anterior parietal peritoneum by means of three sutures. At first, the uterus lies out of the pelvis, but within a few weeks it assumes an almost normal position.

ELEANOR PERCIVAL

The Influence of Disease of the Thyroid on Menstruation. Hill, H. G., & Smith, J. F., *J. Obst. & Gynæc. Brit. Emp.*, 1928, xxxiv, 701.

The relation between thyroid and ovarian activity has been recognized for some time. In some forms of thyroid disease menstruation is suppressed, while in others it is increased. In a study of 300 cases of thyroid dysfunction, in which basal metabolic rates were determined, the following conclusions were reached:

1. Cretinism.—If untreated before puberty menstruation is usually established late. If properly treated, the onset and type of menstruation are normal.

2. Hyperthyroidism.—The periods tend to be scanty and irregular and, in very severe cases, may be suppressed.

3. Hypothyroidism.—Here menorrhagia is the rule.

4. Simple Adenoma.—If the basal metabolic rate is within normal variations, menstruation is not disturbed.

ELEANOR PERCIVAL

XUM

PÆDIATRICS

The Etiology of an Epidemic of Enteritis Associated with Mastoiditis in Infants. Dick, G. F., Dick G. H., and Williams J. L., *Am. J. Dis. Child.*, 1928, xxxv, 955.

These authors report an outbreak of enteritis associated with mastoiditis in a foundling home. The epidemic is interesting because it was due to a primary intestinal infection with the Morgan dysentery bacillus, and was regularly complicated by otitis media and mastoiditis. In the more chronic cases, the subsidence of the acute intestinal inflammation and the progression of the mastoid lesions, which resulted in necrosis of the petrous portion of the temporal bone or sinus thrombosis and meningitis, obscured the intestinal origin of the disease.

"That this epidemic of enteritis associated with mastoiditis in infants was primarily an intestinal infection is shown by the results of bacteriological examination in which the Morgan dysentery bacillus was found, and by the fact that the epidemic was controlled through discarding all foods which were not fresh and which could not be boiled, and the adoption of measures to prevent the transfer of intestinal bacteria by the fingers of nurses."

R. R. STRUTHERS

The Sex Factor in Infantile Tetany, Bakwin, H., and Bakwin, R. M., *Am. J. Dis. Child.*, 1928, xxxv, 964.

This paper reviews the sex incidence of tetany in 136 cases at the Bellevue and Babies' Hospital, New York. Of these 68 per cent were boys and 32 per cent girls. Apparently, infantile tetany is twice as common in boys as in girls. This indicates a predisposition on the part of males for tetany comparable to that of females for chorea. This predisposition is even more marked below the age of 8 months. The increased severity of the disease in males is striking. All the deaths in the series reported occurred in male infants.

R. R. STRUTHERS

PATHOLOGY

Pulmonary Asbestosis in South Africa, Simson, F. W., *Brit. M. J.*, 1928, i, 885.

It has been known for some time that workers exposed to the dusty atmosphere attendant on the preparation of asbestos materials suffer pulmonary disabilities, but very little has as yet been written concerning the pathological changes in lungs caused by the asbestos itself.

Dr. Simson now publishes details of four patients in whom certain special pulmonary changes were noted in conjunction with their having been employed in asbestos mines in Southern Rhodesia. In two of these there were connective-tissue changes which were different from those found in tuberculous conditions, and were also in contrast to the sharp definition of silicotic nodules, but the most striking feature common to all four was the occurrence of numerous golden yellow bodies which were found either embedded in the fibrous tissues, lying free in the alveoli, or contained in phagocytic cells. They varied in shape, but usually had rounded or club-like ends, with a segmented body tapering to a finely pointed tail. They were non-refractile to polarized light, soluble in strong acids, and on being heated turned black and tended to lose their outline. They gave a well marked Prussian blue reaction with hot diluted hydrochloric acid and potassium ferrocyanide. These and other tests led to the conclusion that the bodies contained a large percentage of iron.

Comparison was made with sections of lungs from a large number of miners on the Rand who had died from silicosis and tuberculosis, but in none of these could there be found any such bodies as those described. Confirmatory evidence of their connection with asbestos dust was obtained from the lungs of a guinea pig which had been exposed to the dust under experimental conditions; the presence of the golden yellow bodies was easily demonstrated in the animal.

These bodies therefore seem to be undoubtedly associated with asbestos, not as it is mined in open quarries but in the mills where waste rock is crushed for extraction, and where the asbestos undergoes carding and spinning.

As regards the association of asbestosis with other pulmonary diseases, evidence is being accumulated to show that phthisis occurs with sufficient frequency among asbestos workers to warrant the suggestion that this occupation serves as a predisposing factor to a certain extent.

H. E. MACDERMOT

Blood Vessels in the Valves of Normal Hearts. Ritter, S. A., Gross, L., and Kugel, M. A., *Am. Heart J.*, 1928, iii, 433.

These workers have studied 700 hearts by their injection method to determine the existence or otherwise of blood vessels in the valves. In this series there were 14 cases in which both the study of the gross and microscopic appearances, and the clinical history of the patient, showed the heart to be apparently perfectly normal, and yet to present blood vessels in some of the valves. This fact and other reasons given make it highly improbable that the vascularization of the valves in these 14 normal hearts owes its origin to inflammation, or that the vessels are other than embryonic vestiges.

M. E. ABBOTT

THERAPEUTICS

The Treatment of Malignant Disease by Colloidal Lead. Wyard, S., *Brit. M. J.*, 1928, i, 838.

Dr. Wyard felt that the success claimed for the treatment of malignant disease by injections of colloidal lead warranted a careful investigation of the method, and he now presents a report of his work on the subject. Working in association with Dr. Lorna King, he treated a series of 88 patients by this method, but, in order to compare his results with those of Dr. Blair Bell, he omits details of 32 of these cases, in whom he used a preparation of colloidal lead hydroxide which differed slightly (although, as he thought, advantageously) from that used by Dr. Bell. Little importance is attached to the statement that satisfactory results could only be obtained by preparing the lead in a particular manner, since the method of preparation was apparently changed several times in Liverpool.

Fifty-six cases were treated strictly by the Liverpool method. It was impossible to obtain supplies of the colloidal lead, and Dr. Wyard therefore prepared his own by means of a special electrical apparatus. He lays emphasis on the fact that even with the greatest care and attention to details the preparation is very unstable and cannot be prepared in bulk for use at a later date.

Most types of malignant disease were treated, epithelioma, carcinoma, and sarcoma. In every case the disease was at an inoperable stage, or was recurrent after operation. It was not easy to obtain patients who fulfilled the conditions necessary for an investigation of this type, since they were either receiving radiation, or some other form of treatment which would vitiate conclusions as to the lead treatment, or else they were too far gone for any form of treatment.

Some difficulty was experienced in establishing the dosage and the interval between treatments. Very severe reactions were found to follow what seemed safe quantities. The interval could only be decided by clinical experience. No reaction in the growth itself could be detected with certainty, except that in two cases the mass presented pain and swelling.

The paper goes into the various changes produced by the lead, in great detail, and should be consulted for such.

Autopsies were made in 17 of the cases, with remarkably constant findings. In no case was there any sign of retrogression of the growth; in every case the mass was larger than at the beginning of the treatment. In nearly every instance the brain showed a marked degree of superficial œdema; the liver, extreme fatty degeneration; and the kidneys some degree of desquamation of the convoluted tubules. Dr. Wyard feels justified in ascribing these constant changes to the toxic action of the lead.

His final conclusion is that there is no support for the statement that colloidal lead exerts any beneficial influence on the progress of a malignant growth. Of the 56 patients treated, only one showed definite improvement, and in this there was some doubt regarding the malignancy of the gland involved (a small supraclavicular node following amputation of the breast one year previously). On the other hand, of 40 patients who received enough treatment to warrant the expectation of some benefit ("if any ever occurs"), 22 died; 11 were clearly worse; 6 showed no change either way, and only one improved.

In addition to this he points out that the method is difficult and dangerous.

H. E. MACDERMOT

To Promote Sleep—The Institution of Civil Engineers held a *conversazione* at the Institution, Great George Street, Westminster. An exhibit which excited much interest was the Yarrow-Hyde bed. This was shown by Sir Alfred F. Yarrow, for whom it was constructed in order to promote sleep. It was explained that during a journey last autumn from Vancouver to Montreal he found that when the train was in motion he slept far better than when it was still. He tried experiments similar to those which he made many years ago on the vibration of ships, and he determined to repeat, if possible, in an ordinary bed, the vertical movements of a train. He asked the National Physical Laboratory to study the subject. Mr. Hyde, one of the engineering staff, provided a solution of the problem, and the result is the Yarrow-Hyde bed, which, it is stated, has a movement that corresponds so far as practicable in amplitude and frequency to what was found in the train on the Canadian Pacific Railway. A simple crank mechanism worked by an electric motor provides a gentle rise and fall of the bed at its head.

Obituaries

Dr. Charles Magee Anderson, of Toronto, Director of Laboratories, Ontario Department of Health, died suddenly on July 19th in his 38th year, at the home of his father-in-law, George E. Firth of Burritt's Rapids on the Rideau River. He was a native of Ottawa, the son of the late William and Mrs. Anderson. He received his education at the public schools and Ashbury College; at McGill he received the degree of M.D., C.M.; and at Johns Hopkins University he obtained the diploma of D.P.H. He served overseas in the Imperial Forces with the Royal Sussex Regiment as medical officer during the Great War. For eight years he had been in his provincial position at Toronto and was widely known in Ontario in connection with his public health work.

Dr. J. N. H. Campeau. It is with regret we announce the death of Dr. J. N. H. Campeau, which occurred at his residence, 3672 Lasalle Boulevard, Verdun, on July 11, 1928. Dr. Campeau was born at Rigand on July 17, 1868, was educated at Rigaud, and graduated in medicine from Laval University in 1889.

Dr. Peter Anderson Dewar died on April 7, 1928, at his residence in Walkerville, Ont. He was born on a farm in Lambton County on September 4, 1859, and received his early education in the public schools of that county and in the Sarnia Model School. His first profession was that of teaching, and from that he stepped into medicine, graduating from Trinity Medical School in Toronto in 1885, with first class honours. He began practice in Essex, Ont., and remained there for eleven years, during which time he built up a very extensive clientèle, and also took an intense interest in the civic affairs of the town. In 1896 Dr. Dewar moved to Windsor, where he practised until a few months before his death, when ill-health compelled him to moderate his activities.

During his professional career he started a number of young graduates on the road to success. His favourite maxim to them was "Be ye known as a physician," and he himself always kept this ideal in mind and lived up to it fully, with the result that he was widely known as one of the most brilliant and successful physicians of western Ontario.

Two years ago he was given a dinner and a presentation, which testified to the high regard in which he was held by his fellow practitioners, as well as by the community in general. This marked the completion of forty years active practice in Essex County, and was attended by about one hundred representative citizens of the border cities.

He is survived by his wife, (née Annie K. Nesbit) and five daughters.

Dr. Andrew Love, who died at New Glasgow on June 16th, was one of the best known practitioners in Nova Scotia. He graduated at McGill in 1891, and after a year or two at country practice located at Sydney Mines. Here he quickly developed a large practice and identified himself prominently with community affairs. On the outbreak of war he volunteered for overseas service, and was soon sent to France, where he was engaged until hostilities ceased.

On returning home, he located at New Glasgow, and was soon well established there. For two years or more he had been in indifferent health, possibly as a result of war service, but the illness which resulted in his death was of only a few days' duration.

Dr. Love was very popular; served in the Town Council of New Glasgow; was Commissioner for Pictou County of the Boy Scouts Association; and on one occasion accepted a nomination to contest Pictou County in the interests of the Conservative party, although he resigned before the election came on. He enjoyed an enviable reputation as a practitioner, and was highly esteemed by all classes and creeds.

Dr. Daniel Angus McAulay, of Baddeck, died recently under unusually sad circumstances. Dr. McAulay, who was one of the younger members of the profession, graduated from Dalhousie in 1910. He was one of those who responded early to his country's call, and served under the colours almost throughout the war with credit. He settled in Baddeck soon after his release from military duty, and quickly won a place in the esteem and affection of that charming village. A few days before his death, while operating on a septic case, he became infected and it soon became evident that his condition was very serious. He was removed to hospital at North Sydney, where every effort was made on his behalf, but death occurred on June 16th.

Hon. Dr. L. P. Normand, ex-mayor of Three Rivers and Minister in the Meighen cabinet of 1921, died at his residence, Three Rivers, on June 27th, after a short illness.

Hon. Louis Philippe Normand, M.D., was a prominent physician and had been head of the Medical Council of Canada. Born at Three Rivers, Que., on September 21, 1863, the son of Telesphore E. Normand and Alphonsine Giroud, he was educated at LaSalle Academy, St. Joseph Seminary and Laval University, graduating as M.D. from the latter in 1886. Later he pursued his medical studies in the United States, Great Britain, France and Italy.

Dr. Normand always took a keen interest in municipal affairs, and was mayor of the city of Three Rivers for four consecutive terms. When Right Hon. Arthur Meighen re-organized his cabinet before the general election of 1921 Dr. Normand was sworn in as President of the Privy Council. He contested Three Rivers-St. Maurice in the Conservative interest, but was defeated and went out of office with the resignation of the Government in December, 1921.

On February 5, 1891, Dr. Normand married Melle. Graziella H. Beaulieu, daughter of Charles Beaulieu, of Sorel, Que. The children are: Philip, a priest; Hortense, Hudon, Louis P., Jeanne (married to Georges A. Gouin), Joseph, Margaret, Jean and Pierre.

Dr. Normand enjoyed extraordinary popularity in his district. His professional attainments were of a high order and had been widely recognized by medical associations and institutions, not only upon this continent but in Europe.

DR. NORMAND: AN APPRECIATION

With the death of Dr. L. P. Normand, of Three Rivers, which happened the last days of June, we have to bewail the loss of a leading figure in our Canadian profession. Dr. Normand was not only a brilliant surgeon in his native Province of Quebec, but a leading figure in our profession far and wide in Canada.

Born in 1863, he graduated after eight years of classical studies at Laval University, well prepared for the high positions he was later to occupy. We all know the importance attached in England and Scotland, as well as on the continent, to a good basis for future medical studies and the high opinion in which classical studies are held as a solid *grundlage* for further studies. He graduated B.A. with honours, and later completed his medical studies in New York and Paris, as well as London.

He settled down in Three Rivers, the centre of a most active industrial area, that of the St. Maurice River, a thriving little city of over 30,000 souls to-day. His fame as an able and conscientious surgeon grew rapidly and people flocked to him from all over the vicinity as well as from far away.

President of the local medical society and President of the Second Congress of French-speaking Physicians of America, still higher honours awaited him. Soon he was elected President of the Province of Quebec College of Physicians and Surgeons, and later was called to the high position of President of the Medical Council of Canada.

Always of broad ideas, of a congenial mind, well-read, well-travelled and well-trained in his profession, he had a host of friends far and near.

After the conflagration which swept his native town, he was called to the leadership of the City Council and through his energy and enterprising spirit recreated a new city, which all motorists from Montreal to Quebec admire. He even entered the political field and was Minister in the Meighen Cabinet.

Honours came to him plentifully, and particularly did he prize his elevation as Knight Commander of the Order of Gregory the Great by the Pope for services to the community, and Officer of the Legion of Honour by France for his devotion to the cause of education, public as well as medical.

The disappearance of such men is a loss not only to their own community but also to our profession.

He laboured well and deserved well.

EUG. ST. JACQUES

Dr. E. Virolle. The death occurred suddenly, on July 4th, at his residence, 116 Laprairie Street, of Dr. Eugene Virolle, well-known teacher at the University of Montreal, aged 54 years. He was born in 1874 in Montreal, and was prominent in medical circles. At the time of his death he was Professor of Anatomy at the University of Montreal.

Dr. John Percy Waddy died in Toronto on June 25th in his 79th year. Dr. Waddy was born in Ireland and received his education there, coming to Canada forty years ago. After many years' practice in Muskoka Dr. Waddy moved to Mount Albert, and, later retired to Toronto where he had lived up to the time of his death.

News Items

GREAT BRITAIN

The Leishman Memorial

On June 2nd, two years after his death, a memorial tablet to Lieut.-General Sir William Leishman, K.C.B., F.R.S., was unveiled in the chapel of the Queen Alexandra Military Hospital, Millbank, and following the ceremony another tablet was unveiled in the pathological laboratory of the Royal Army Medical College. A brief dedicatory service was conducted by the Chaplain-General of the forces. These tablets form part of the memorial subscribed for by the officers, non-commissioned officers and men of the Royal Army Medical Corps. The main portion consisted in the medal which had been struck and the prizes offered for competition to officers and men of the corps. It was stated at the unveiling that, while the memorial in the chapel was intended to commemorate Sir William Leishman as a great Director-General, the memorial in the laboratory recalled him as a teacher, an eminent man of science, a research worker, and a discoverer of world-wide renown. Although the memorial had been erected at Millbank, it was only right to say that much of Leishman's work was carried out elsewhere. The original discovery of the parasite of kala-azar was made in the old laboratories of the Army Medical School at Netley; there also Leishman prepared the stain which bore his name, and it was there he was associated with Almroth Wright and David Semple in work on the typhoid vaccine—work which was subsequently to develop to such a remarkable extent in the army, to be the means of saving thousands of lives of British soldiers in India and elsewhere, and to be adopted and adapted by practically every nation in the world. As professor of pathology Leishman put in very strenuous work.

General Harvey described his teaching carried on in that very room, and his gradual attainment to the position of a national figure in the field of research, so that there was hardly a piece of organized medical research with which he was not connected; but he added that Leishman was not a scientist so absorbed in his pursuit as to be oblivious of the claims of family and friends. He was a devoted husband and father, and nothing would have pleased him more than the high degrees in science recently obtained by two of his daughters and the academic career of his son. "Tablets will crumble in the course of time, but the name and fame of William Leishman will be passed on," said General Harvey in conclusion, "from generation to generation." The tablet in the college records the fact that Leishman carried out his researches on typhoid, kala-azar, relapsing fever, and other diseases in that place, where he taught from 1907 to 1913. The tablet in the chapel recites his many military, medical, and academic distinctions. The ceremonies were attended by Lady Leishman and other members of the family, and by a large number of past and serving officers, while among others present were Sir John Rose Bradford (President of the Royal College of Physicians), Dr. Andrew Balfour, Sir Almroth Wright, Sir David Semple, and many more who came into close touch with Sir William Leishman's life and work.

A Relic of David Livingstone

At a meeting of the Royal Faculty of Physicians and Surgeons of Glasgow on February 6th, Mr. G. H. Edington, the president, in the chair, the surgical pocket-case used by David Livingstone during his daily work in Africa was presented to the Faculty by Dr. Freeland Fergus, on behalf of Mr. Hilliard, surgical instrument maker in Glasgow, to whom the relic belonged, but who was prevented by his state of health from attending the meeting. In the course of a letter from Mr. Hilliard it was recalled that Dr. Livingstone had been born at Blantyre, some seven or eight miles distant from the hall of the Faculty, and had obtained his licence to practise from the Faculty of Physicians and Surgeons at Glasgow. Through Mr. Hilliard's influence, the instrument case which belonged to Dr. Beatty, R.N., the surgeon on board the *Victory* at the battle of Trafalgar, had been, some years ago, presented to the Royal Faculty of Physicians and Surgeons. Dr. Fergus mentioned that Mr. Hilliard had been the close friend of Dr. Livingstone's son, Mr. W. Oswell Livingstone, from the old High Street College days. In 1909 Mr. Hilliard had followed the steps of the explorer in many districts, including the flourishing town of Livingstone and other places bordering on the Zambezi. Many offers had been received for the relic from wealthy collectors in America, London, and Scotland. Dr. Fergus added that

XUM

although Mr. Hilliard was not a member of the medical profession, he had been connected with it all his life, being born in the Royal Infirmary, where his father, as cutler and instrument maker, had at that time an official residence.

Sir Ronald Ross as a Pupil

Sir Ronald Ross has been the recipient, at the hands of Lord Leverhulme, of the Harben Gold Medal of the Royal Institute of Public Health. This medal, which has been won by such famous men as Pasteur and Lister, is awarded every three years for "eminent services to public health, irrespective of nationality." Sir William Smith, principal of the Royal Institute of Public Health, recalled during the simple ceremony that Sir Ronald Ross was one of his pupils. "He was one of the most difficult men with whom I have had to deal," he said. "In fact, I thought he would never pass the examination for public health. Now he has long left his teacher behind."

The Dawson Williams Memorial Fund

The Committee having in charge the duty of arranging for some suitable memorial to the late Sir Dawson Williams, Editor of the *British Medical Journal*, report that a sum somewhat in excess of £800 has been collected. Trustees have been appointed who have suitably invested this sum. It has been recommended that the memorial take the form of a Prize, to be awarded every two years, or at longer intervals, for the best work on Pædiatrics which has appeared since the last award.

NOVA SCOTIA

The graduating exercises of the training school of Kings Memorial Hospital, Berwick, were held in June. The principal speaker was Dr. H. K. MacDonald, of Halifax, whose address to the graduating class was replete with sound advice.

On June 12th, eleven nurses graduated from St. Joseph's Hospital, Glace Bay.

It have been decided to rebuild the Amherst Hospital, the destruction of which by fire was mentioned last month, on the site of the old building. It has been found that the old walls can be utilized to a considerable extent. Several architects are interested in the preparation of plans for the new building.

It will be remembered that the nursing staff had no opportunity of saving any of their effects on account of the necessity of removing the patients. The citizens of Amherst raised a subscription and each nurse has been presented with a cheque for one hundred dollars towards re-imbursing her loss. Investigation by the fire-marshall led him to the opinion that the fire was due to defective electric wiring.

At the annual meeting of the Registered Nurses Association of Nova Scotia, held in Yarmouth in June, Miss Catherine M. Graham, of Halifax, was elected to the presidency.

The Massachusetts-Halifax Health Commission ceased its activities at the end of May. It is understood that the Victorian Order of Nurses will take over some clinics which were conducted by the Commission in the north end of the city. The public health nursing service maintained by the Commission is not likely to be continued.

Dr. T. M. Sieniewicz, who has been Acting Executive Officer for the Massachusetts-Halifax Health Commission during the past few years, accompanied by Mrs. Sieniewicz, will spend the next three months in Europe, where the doctor will visit many of the more important tuberculosis clinics and make a special study of the various phases of anti-tuberculosis work.

Dr. John Stewart, Dean of the Faculty of Medicine of Dalhousie University, who commanded the Dalhousie Unit during the war, celebrated his eightieth birthday on July 3rd. A host of friends called upon the Dean to wish him many happy returns of the day, and he was the recipient of many congratulatory letters and telegrams from distinguished colleagues in various parts of the world.

It was a source of much delight to the medical profession of Nova Scotia that the annual meeting of the Canadian Medical Association, at Charlottetown, should have been so successful. Bluenose physicians generally extend hearty congratulations to their colleagues of the tight little Island upon having carried through a very ambitious undertaking with such conspicuous success.

The Sutherland Memorial Hospital which replaces the Pictou Memorial Hospital was opened with appropriate ceremonies on June 27th. His Honour, the Lieutenant-Governor was present and made a congratulatory address. Dr. John Stewart of Halifax, whose earlier years of practice were spent in Pictou, unlocked the doors and declared the hospital open to the public. Among others who spoke was Dr. Kenneth A. MacKenzie, of Halifax, who claimed Pictou as his birthplace. The hospital is an attractively designed, well-planned brick building, and occupies a beautiful site which commands a broad view of Pictou harbour and surrounding country. A very generous contributor to the new hospital is Mr. Daniel Sutherland, a highly respected and much beloved citizen of Pictou.

The Refresher Course for Nurses, arranged last year by Dalhousie University, proved so successful that a very general desire was expressed that it should be made an annual event. This year the course was held during the latter part of June, and attracted a large attendance of nurses from each of the Maritime Provinces. Contributing to the program were a number who do not belong to the Dalhousie staff, notably Miss Beard, director of the nursing activities of the Rockefeller Foundation, who gave greatly enjoyed addresses on three days, and otherwise took an active part in the proceedings.

In connection with the summer school now being conducted by the Department of Education, more attention is being given than formerly to the teaching of Public Health. Drs. Jost and Chisholm, of the Provincial Department of Health, and Dr. C. S. Marshall, Provincial Psychiatrist, are giving instruction which is intended to impress the teachers with the importance of public health work, and to point out to them the opportunity they have of instilling the principles of personal hygiene in the minds of school children.

Word has been received that Mr. Harry S. Morton, the son of Dr. Charles S. Morton, of Halifax, has passed the second examination for the medical degree of the University of London, and has also passed the primary

Fellowship examination of the Royal College of Surgeons, London.

Dr. Lewis Hunt, a native of Nova Scotia, who has spent the greater part of his professional career in England, died recently at his home in Richmond. For several years, Dr. Hunt was mayor of Richmond. Last summer he spent several months in Nova Scotia, looking up old friends.

Dr. D. J. Hartigan, of New Waterford, has ventured into a field which is rather new for physicians. He and his brother have purchased a coal mining property, with the intention of developing it.

W. H. HATTIE

QUEBEC

Infantile mortality continues to take its toll, though the figures are improving. Returns for last December give an infantile mortality rate for the Dominion of 85 per 1,000 living births, as against 100 per 1,000 in the December previous. Quebec, among the provinces, had the highest infantile mortality rate for last December, namely 112.4 per 1,000; Ontario the lowest, with 65.6. Quebec's rate shows a big improvement, as against 125 in December, 1926. Alberta shows the biggest relative improvement. In December, 1926, the Alberta rate was 113.2; last December it was 68.8.

Following an address on health by Dr. A. Lessard, Director of the Provincial Bureau of Health, the county council of Chambly decided to apply for a health unit with a clinic. These health units are established by the provincial authorities, and at the meeting at Longueuil lately it was decided to apply to the Rockefeller Institute for additional assistance. Part of the expense is paid by the county and part by the province, and the county chooses the doctor. This doctor passes his certificate test, and is then eligible for the position of caring for the clinic or health unit. He cannot then be discharged, except with the approval of the government. Not only physicians, but nurses are planned for Chambly County. They will instruct the women in their community in the care of infants. The probable centre for the health clinic will be Longueuil. The council plans also the introduction of serums for certain diseases.

In connection with the appointment of the new head of the Provincial Police, it is believed that Dr. Wilfrid Derome, medico-legal expert, will be given a new post, that of technical advisor to the Provincial Police and director of scientific research. Dr. Balthazard, in Paris; Dr. Reiss, in Geneva; and another medico-legal expert in Lyons, are filling such positions, and it is said that a police department which has once had the many advantages of a scientific director should not be without such an officer.

Dr. J. E. Belanger, President of the College of Surgeons of the Province of Quebec, has been appointed medical officer of the new Workmen's Compensation Board, which will commence its duties on September 1st.

The construction of an annex to the Civic Hospital of Quebec will in all probability be deferred until next year, as the amount which was tentatively suggested, $40,000, is insufficient to build anything which will be practical. It is likely that the Civic Hospital item will be dropped from the forthcoming referendum and will be put on the list for next year, in a revised form. The ratepayers will be asked to vote on a larger amount, which will include both the cost of construction and furnishing the annex.

Since the navigation season opened nearly thirty cases have been treated at the Immigration Hospital in Savard Park, Quebec, for scarlatina, measles, diphtheria, and fractures. A new wing is to be added to the present hospital, which will give an additional 180 beds, and at the same time provide quarters for clinics, sterilization, and x-ray. Tenders are to be called for the construction of the annex, which is expected to cost $75,000. Work will be pushed in order to have the wing completed for the autumn.

The City of Montreal provided two-thirds of the people on whom inquests were held in the Province of Quebec during 1927, according to official statistics. Among these, French-Canadians out-numbered all others by 20 per cent. In all, there were 3,227 persons upon whom inquests were held during the year, and their numbers, by nationalities, were as follows: French-Canadians 2,329; Canadians of British origin: English 424, Scotch 68, Irish 125, others 136; Italians 25; Russians 12; Greeks 5; Americans from the United States 13; other nationalities 90. Montreal provided 1,282 French-Canadians, 389 English-Canadians, 64 Scotch-Canadians, 87 Irish-Canadians, and 130 other Canadians of British origin. In addition, inquests were conducted in the city of Montreal over 34 Italians, 11 Russians, 3 Greeks, 10 Americans, and 66 other nationalities for a total of 2,066, out of a provincial total of 3,227. Three judicial districts did not hold a single inquest during the year, these being Hull, Richelieu and St. Francis, the latter in the Sherbrooke district.

Montreal's first Anti-diphtheria Week will be ushered in this month. This is being instituted by the Child Welfare Association in order to immunize the 90,000 children of the city, between the ages of one and ten years, against the disease. Dr. A. B. Chandler, Medical Director of the Child Welfare Association, stated that four clinics would be operated by the association in different parts of the city. Three inoculations will be given the patients at intervals of two weeks. Each clinic will be operated by two doctors, five nurses, and five voluntary workers. A charge of 50 cents will be made for each child for the full course of three inoculations, the money to go towards the cost of material. The Medical Director remarked that, in view of the saving of $100,000 to the city in grants that they have made in previous years to the various hospitals for diphtheria purposes, it would be appropriate for the city to pay the 50 cents required from each child for the inoculations.

In a lengthy report on American museums by Dr. E. E. Lowe, Director of City Museums and Libraries of Leicester, published recently by the Carnegie United Kingdom Trustees, tribute was paid to the exhibits in the museum at McGill University and the methods of preparation of these exhibits. Special reference was made to the Strathcona Museum in the medical building, which is being re-arranged under the direction of E. L. Judah, Curator. It is expected that this will be opened to the public early this autumn. Dr. Lowe said in part: "The McGill University of Montreal contains fine medical and other museums which are in the process of steady development, but are at present largely directed towards purely university teaching." In another part of the report, reference was made to the beautiful skeletal preparations, which Dr. Lowe said were excellent, due to a large extent to the care taken by the curator.

GEORGE HALL

ONTARIO

At the June examinations for admission to the College of Physicians and Surgeons of Ontario, there wrote successfully 42 from the University of Toronto, 6 from the University of Western Ontario, and 2 from McGill. The actual number of applicants who were writing is not given.

The following details of the final examination at the University of Toronto Faculty of Medicine are given by the secretary of the Medical Faculty:—

Number of students in final year who graduated, 100; number who graduated with Honours, 3; number who passed with Honours, 9; Faculty Gold Medal, B. Willinsky, D.D.S.; First Silver Medal, J. W. Shier, B.A.; Second Silver Medal, E. F. Brooks; J. J. Mackenzie Prize in Pathology, B. Willinsky, D.D.S.; The Chappell Prize in Clinical Medicine, E. F. Brooks; George Armstrong Peters Prize in Surgery, B. Willinsky, D.D.S.; Starr Silver Medal, F. N. Allan, M.D., *cum laude;* The Ellen Mickle Fellowship, B. Willinsky, D.D.S.; The Charles Mickle Fellowship, Sir Henry Head, F.R.S., M.A., M.D. (Cantab.), M.R.C.P., Lond., M.R.C.S., Eng., F.R.C.P., LL.D., Edin.

The Secretary of the Medical Faculty of Queen's University makes the following announcements in connection with the final year in medicine. The degree of M.D., C.M., was conferred upon 57 gentlemen. No less than 50 obtained hospital appointments in various institutions of Canada and United States. The prizes and awards were as follows:—

The David Edward Mundell Scholarship of $50.00, awarded to the student making the highest aggregate marks in the Surgical Applied Anatomy final examinations of the fifth and sixth years, A. B. Susman, B.A., Kingston, Ont.

Canadian National Committee for Mental Hygiene Scholarship of $50.00, awarded to the stundent making the highest number of marks in Psychiatry, G. C. Ferguson, B.A., Bishop's Mills, Ont.

A Prize of $20.00 in gold, given by Dr. James of Mattawa, for the best examination in final year Medicine and Clinical Medicine; Honour to G. C. Ferguson, B.A., Bishop's Mills, Ont.; Award to H. W. Justus, Winchester, Ont.

A Prize for the best series of pathological cases, given by Dr. James Miller, R. K. Start, Toronto, Ont.

Professor's Prize in Medicine and Clinical Medicine, L. B. Carruthers, B.A., Sarnia, Ont.

Professor's Prize in Surgery and Clinical Surgery; H. W. Justus, Winchester, Ont.

Dr. D. T. Smith's Prize in Pharmacology; J. A. Kearns, Quyon, Que.

Medal in Medicine; G. C. Ferguson, B.A., Bishop's Mills, Ont. Medal in Surgery; L. B. Carruthers, B.A., Sarnia, Ont. N. B. GWYN

An anonymous benefactor has undertaken to contribute $50,000 towards the establishment of a Chair of Preventive Medicine in Queen's University, Kingston, in honour of Dr. Arthur Elliott, an alumnus who formerly practised in Belleville.

In considering this gift, the authorities of Queen's hope to obtain annual support from the Ontario Government and other interested bodies which will permit the erection of a building costing in the neighbourhood of $200,000. This Public Health Building will be a part of the Faculty of Medicine, and the hope is entertained that the Provincial Government will make it the centre for the health activities of the eastern counties of the province.

MANITOBA

Hon. Dr. E. W. Montgomery, accompanied by Mr. Isaac Pitblado, K.C., Dr. M. S. Fraser, and Sergt. Rose, R.C.M.P., has returned to Winnipeg after journeying more than six hundred miles in northern Manitoba, chiefly by canoe. The party left The Pas June 10th, and returned to that point on June 28th. The trip took them successively to Reed Lake, Elbow Lake, Cranberry Lake, Lake Athapapaskow, Flin Flon, and Mandy Mines, and back via Cold Lake and Sherritt-Gordon mines; up Cold River to Flatrock Lake, down to Brentwood Lake, Nelson House and out to Mile 185. The party then went to the end of steel at mile 356, and being advised that ice conditions did not permit sailing vessels to approach Fort Churchill, to which point it had been their intention to go, they returned southward.

Dr. Montgomery reports health conditions among the Indians, miners, prospectors and railway workers to be satisfactory.

A successful meeting of the Brandon and District Medical Society was held at Souris on June 29th. The following program was presented: Dr. H. O. MacDiarmid (Brandon), "Acute mastoiditis and its complications"; Dr. Bruce Chown (Winnipeg), "Pneumonias of infancy and childhood"; Dr. E. J. Boardman (Winnipeg), "Hypertrophy of the prostate."

The biennial meeting of the Canadian Nurses Association was held at the Fort Garry Hotel July 3rd to 7th, under the presidency of Miss Mabel F. Gray, head of the Department of Nursing, University of British Columbia. At the evening session of July 3rd, addresses of welcome were given by Miss A. E. Wells, representing the Manitoba Association of Graduate Nurses, Mayor MacLean, Hon. Dr. E. W. Montgomery, Dr. H. M. Speechly, representing the Manitoba Medical Association, and to these Miss Gray, the acting president, made reply. Prof. R. C. Wallace gave an address on the work of the public health nurse, particularly in outlying districts. The question of affiliation of the Canadian Nurses Association with the Canadian Medical Association was under discussion, as was also the national enrolment of Canadian nurses for emergency service in times of disaster, war, etc. At the evening session of July 5th, addresses were given by Hon. R. A. Hoey, Minister of Education for Manitoba, by Miss Ruth Hallowes, Educational Director, College of Nursing, London, Eng., on "Tradition in English Nursing," and by Dr. A. T. Mathers on "Mental Hygiene and the Nurse."

The new ten bed hospital at Mile 327 on the Hudson Bay railway is now complete in every detail and patients have been received and cared for in it for the past week. This is a modern steamheated structure, built in bungalow style with a full basement, running water, and electric lights. Dr. L. R. Shier is the physician in charge, under Drs. Orok and Stephansson of The Pas, the C.N.R. surgeons; and Miss E. K. Cotter is the attending nurse. During the past two years, the hospital at Mile 327 has been housed in cars which have lately been removed to Mile 214, with Dr. R. E. Holbrook in

charge. Twelve-bed tents with wooden floors and walls house the hospital at the Silkox River, Mile 394. Drs. C. B. Stewart and A. Ferguson are in charge here. Drs. Orok and Stephansson also have a gas-car patrol carrying a physician up and down the line once a week, and Dr. Shier at Mile 327 has a gas-car at his disposal.

The report of the city of Winnipeg Health Department for the year ending December 31, 1927, is now available. The number of deaths, excluding stillbirths, was 1,650. Assuming the population to be 198,932, this gives a gross death rate of 8.29, the lowest death rate for this city on record. The number of deaths in children under one year of age was 273, giving a mortality rate of 61.17 per 1,000 living births, which again is a new low rate. When infant welfare was embarked on as part of the civic program the rate was 207. Dr. A. J. Douglas, Medical Health Officer, feels that it is possible to get the rate of 61.17 still lower, by continuing the work and broadening the education of the public as to its possibilities.

The number of births, excluding stillbirths, was 4,463, giving a birth rate of 22.44 per 1,000 population. Stillbirths numbered 200. Of the 273 infants who died during the year 106, or 38.8 per cent, died within the first week of life. While infant mortality rates were ranging between 100 and 200 per 1,000 live births, stillbirths were of lesser importance, but now that the infant mortality rate is about 60 and the stillbirth rate is 45, the latter assumes a new prominence, especially when it is considered that out of the 273 infant deaths, 64 occurred within 24 hours after birth and that out of the 200 stillbirths registered in 1927 a large proportion occurred within 24 hours before birth.

Births in hospitals and nursing homes during 1927 were 73 per cent of the total. In 1912 the percentage was 31.5. Physicians were in attendance in 95.7 per cent of cases and midwives in 4.3 per cent. In 1920 the figures were respectively 89.0 per cent and 11.0 per cent.

There were 25 puerperal deaths, giving a puerperal mortality rate of 5.6 per 1,000 live births. The rate for residents was 4.5, and for non-resident women, who were confined in Winnipeg, the rate was 8.6.

Of communicable diseases there were 27 cases of typhoid with 6 deaths; 48 cases of smallpox with no deaths; 542 cases of diphtheria with 34 deaths; 885 cases of scarlet fever with 6 deaths; and 221 cases of tuberculosis of the lungs with 74 deaths. Of the smallpox cases developing within the city all cases were unvaccinated, save two contacts whose vaccinations were performed some days after exposure. Dr. Douglas points out that the number of unvaccinated people in the city is too high. Diphtheria in 1927 showed increased virulence, with 34 deaths, as against 20 in 1926. A group of cases occurred in which the infection was probably due to association of the diphtheria organism and the streptococcus. These cases were characterized by the presence of hæmorrhagic sloughing membranes, high temperature, great prostration and rapidly fatal termination.

The Registrar of the University of Manitoba has received a cable from the Commissioners for the Exhibition of 1851 to the effect that a Scholarship has been awarded to Douglas Roy McCullagh, B.A., M.Sc., a graduate in arts and science of the University of Manitoba and a former medical student. Mr. McCullagh, whose father is Rev. Dr. McCullagh, now of Boissevain, was full time demonstrator in biochemistry in 1926-27 under Prof. A. T. Cameron, and pursued his work for the M.Sc. degree in biochemistry. In 1927 he proceeded to Cambridge, where he has worked under Sir F. G. Hopkins. He has published in the *Biochemical Journal* a paper on a pancreatic factor, not yet isolated, controlling muscle metabolism.

SASKATCHEWAN

The annual meeting of the Saskatchewan Medical Association will be held at Prince Albert, September 13th and 14th. An excellent program has been arranged. The speakers will be Dr. Primrose, Toronto; Dr. J. C. Meakins, Montreal; Dr. Roscoe Graham, Toronto; Dr. F. F. Tisdall, Dr. T. C. Routley, Dr. G. Harvey Agnew, of Toronto.

An extra-mural post-graduate tour was conducted in this province from July 7th to 18th. Lectures were given at the following points: Swift Current, Moose Jaw, Weyburn, Regina, Broadview, Melville, Saskatoon, Prince Albert and North Battleford. The lectures were conducted by Dr. A. P. Hart of Toronto and Dr. H. P. Wright, Montreal, and Dr. Wm. A. Gardner, Winnipeg.

The following medical men have recently registered in this province and are now practising at the following points: C. J. Houston, M.D., L.M.C.C., Yorkton; Sigga C. Houston, M.D., L.M.C.C., Yorkton; J. B. Legault, M.D., L.M.C.C., Domremy; J. B. Swinden, L.R.C.P., L.R.C.S., Edin., L.F.P.S., Glas., L.M.C.C., Rose Valley; James Robinson, M.D., L.M.C.C., Bienfait; Wm. D. McPhail, M.D., L.M.C.C., Kindersley; R. E. Brown, M.D., L.M.C.C., Regina; R. S. Conn, M.D., L.M.C.C., Regina; L. M. Fairbairn, M.D., L.M.C.C., Estevan.

Dr. G. R. Davison, formerly of Wiseton, is now practising at Springwater.

Dr. Leo. Langlois, of Marcelin, is now practising at Prince Albert.

Dr. D. W. Ganton, who formerly practised at Parkside, is now at Henribourg.

Dr. D. A. McKay, of Radville, has opened an office at Crane Valley.

Dr. J. M. Burnett, formerly of Verwood, has opened an office at Colgate.

Dr. F. H. Wheeler of Moose Jaw, is now practising at Neville.

Dr. N. Bellas, who practised at Saskatoon, has moved to Madison, Wisconsin, U.S.A., where he will do institutional work.

ALBERTA

The annual meeting of the Alberta Medical Association will be held at Edmonton on September 18th, 19th, and 20th.

The annual meeting of the Alberta Hospitals' Association was held in Calgary on June 25th and 26th, and was well attended by representatives from many of the hospitals throughout the province.

The following officers were elected for the coming year: Honorary President, Dr. R. G. Brett, Banff; President, Dr. A. H. Baker, Calgary; Vice-President, Dr. A. E. Archer, Lamont; Secretary, Dr. J. A. Montgomery, Edmonton.

XUM

The meeting of the Alberta Association of Public Health Officers was held in Calgary during the same period, and some of its sessions took place jointly with those of the Hospitals' Association. Several papers of much interest were read, and proposals made for the betterment of hospital affairs and of health conditions in the province.

Dr. A. E. Archer of Lamont presented a paper on the "Health Inventorium," a name suggested by the American College of Surgeons "as one by which might be organized the facilities of the staff and equipment of the hospital, in such a manner, that it would be feasible to conduct thorough health examinations periodically for any member of the community. Such an individual having these periodic examinations would know what were his health assets and his liabilities, and he would be the better able to plan his mode of living with intelligence and in greater safety. Each standardized hospital should set aside a room in which the family doctor could make his examination and have at hand every possible equipment, laboratory, x-rays, etc., as well as provide consultants to determine as accurately as possible the patient's condition."

Dr. M. R. Bow, Deputy Minister of Health, placed before the meeting a proposal "for the establishment of a district health department, or unit, where several municipalities might be grouped together, and whose medical needs would be under the control of a thoroughly trained and competent health department, instead of under a medical health officer acting under a small retaining fee." Each unit would consist of twenty-five thousand inhabitants.

The Alberta Association of Public Health Officers elected the following officers: President, Dr. T. H. Whitelaw, Edmonton; Vice-President, Dr. Duncan Gow, Calgary; Secretary-Treasurer, Dr. S. Main, Edmonton.

The second of this year's extra-mural post-graduate tours was held between July 3rd and 16th, and from every point of view was entirely successful. We were fortunate in having a group of clinicians who were able to give instruction of such excellent quality in the special work in which each is engaged. Every lecture and clinic was well attended and followed with great interest. There was more general discussion at these meetings than usual, which gave them an additional value.

Dr. G. R. Pirie and Dr. S. G. Ross, of Toronto University; Dr. J. G. McKay, Superintendent of the British Columbia Mental Asylum; and Dr. J. W. Arbuckle, of Vancouver, comprised the list of visitors. The cities and towns visited were Medicine Hat, Lethbridge, Calgary, Drumheller, Hanna, Red Deer, Stettler, Camrose, Edmonton and Vermilion.

At Calgary, on July 5th, clinics or talks were given at the General Hospital in the morning by Dr. J. W. Arbuckle, on "Eclampsia"; by Dr. G. R. Pirie, on "The rheumatic heart in children"; by Dr. S. G. Ross, on "Pneumonias of childhood."

In the evening at the Country Club, lectures were given by Dr. S. G. Ross, on "Diarrhœa and vomiting in children"; by Dr. J. G. McKay, on "Psychiatry as pertaining to general practice"; and by Dr. G. R. Pirie, on "Constipation in Children."

An advisory board to the Department of Health has been named by the Provincial Government. The personnel consists of Dr. W. A. Wilson, President of the College of Physicians and Surgeons of Alberta, who will represent the medical profession; Dr. George Johnson, Registrar, representing the College of Physicians and Surgeons; Professor E. L. Pope, representing the Faculty of Medicine of Alberta University; Dr. D. Gow, representing the Association of Provincial Health Officers; Dr. R. H. Smith, representing the Superintendents of City Hospitals. Representative for the rural municipal hospitals, C. Stevenson, Secretary, Red Deer Municipal Hospital. The Alberta Nurses Association will have a representative, and there will be two lay women and two laymen representatives.

The travelling tonsil clinics still continue to function in this province. From recent reports they are not seeking the assistance of local physicians. In answer to the criticism made during the past year that children were not properly examined prior to tonsillectomy, the government has appointed Dr. Heber Jamieson of Edmonton to the staff of the clinic.

There has been considerable agitation in several of the municipal hospital districts that sub-hospitals be established in towns nearby to the municipal hospitals. These municipal hospitals have filled a long felt need in country districts. Moreover, the ratepayers have hospitalization at one dollar a day, yet experience has shown that where the hospital district covers several towns or villages, the physicians in the remaining villages, other than the one in which the hospital is located, are simply emergency men and are unable to make a living. The result has been that in some of the smaller towns the residents are without a physician. Unless sub-hospitals are established, or unless the government permits of smaller taxable areas for the erection of six- or eight-bed hospitals, the present state of affairs will be aggravated.

Plans for extensive additions to the Royal Alexandra Hospital, Edmonton, were recently passed upon by the Hospital board and forwarded to the City Council with the recommendation that they be adopted and the required funds be raised. The cost of the new wing will be about $178,000.00, and of the nurses' home $80,000.00. For some time the accommodation in the hospital has been greatly taxed.

Dr. W. A. Wilson, of Edmonton, President of the Council of the College of Physicians and Surgeons of Alberta, is attending the Canadian Medical Association meeting at Charlottetown, where he will give a review of the new laws recently passed by the Alberta Legislature, affecting the medical profession.

Dr. J. H. Egbert, of Halkirk, is now practising at Berwyn, in the Peace River District. Dr. M. Mates of Kitscoty has also located at Berwyn.

Dr. Wilbur McPhail, until recently associated with Dr. Swartzlander of Oyen, is now in practice at Kindersley, Saskatchewan.

Dr. W. F. Carscallen, of Bowden, has taken over the practice of Dr. C. V. Scott, of Innisfail, and has entered into partnership with Dr. C. A. Wagner of this town. At present Bowden is without a physician.

Dr. Arthur Scott, a graduate of Toronto University, has become associated with a group clinic of Drs. Macnab and Lincoln of Calgary, as pathologist.

Dr. Percy H. Sprague, a graduate of Alberta University in 1927, is now associated with Dr. J. V. Baker of Edmonton, having spent the past year in the Provincial Pathological Laboratory.

Dr. T. G. Michie, of Edmonton, is at present acting as locum tenens at Kimberly, B.C., before entering on post-graduate work in the east.

Dr. C. H. McKenzie, recently stationed at Wainwright, has accepted the appointment of physician to the municipality of Ituna, Saskatchewan.

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XUM

Dr. James Kenny, formerly of Retlaw, is now practising in Buffalo, N.Y.

Dr. E. A. Johnson, a recent graduate of Alberta University, is looking after the practice of Dr. F. F. Law, of Tofield, during his absence.

Dr. Charles B. Rich of Manitoba, is now in practice at Kitscoty.

Dr. L. L. Cairns of Trochu has moved to Calgary.

Dr. J. R. Dean of Elnora has taken over his practice.

Dr. E. McGregor, who has been associated with Dr. R. Parsons of Red Deer, has left for Philadelphia. His place will be taken by Dr. Ernest Hunt, a graduate of Toronto University 1927, who has completed a year's interneship at the Toronto General Hospital. Dr. Hunt is the son of Mr. W. G. Hunt, Associate Secretary of the Alberta Medical Association.

Dr. Terence Agnew, of the 1928 class of Alberta University, has opened an office at Peace River Crossing. Dr. W. Barr Murray, of the same class, is practising at Irma.

Dr. W. G. Saunders of Sedgewick is now associated with Dr. G. M. Little of Viking. There is a municipal hospital at this point.

G. E. LEARMONTH

BRITISH COLUMBIA

The annual meeting of the Fraser Valley Medical Society was held on June 19th, when the following officers were elected for the ensuing year: President, E. H. McEwen, New Westminster; Vice-President, Bruce Cannon, New Westminster; Secretary, H. L. Collins, New Westminster; Chairman of Program Committee, W. A. Robertson, New Westminster.

The Pacific North West Pædiatric Society met in Vancouver on June 28th, and the Canadian Association for the Study of Children's Diseases met the following day at the Hotel Georgia. Both meetings were well attended. Among the speakers were Drs. H. B. Cushing and A. W. Canfield, who are touring British Columbia under the Canadian Medical Association post-graduate committee. Other speakers were Drs. Geo. R. Pirie, H. P. Wright, A. P. Hart, H. Spohn of Vancouver. Golf proved a welcome change from too keen an attendance at lectures.

Dr. A. S. Lamb, Government Inspector of Hospitals and Travelling Medical Health Officer of British Columbia, together with Dr. A. D. Lapp of Tranquille Sanitorium are leaving at the end of August from Quebec, to attend the International Tuberculosis Conference in Rome. Some thirty medical men are making the trip under scholarships from the Sun Life Insurance Company. In addition to attending the conference in Rome, the party will attend clinics in England, Scotland, France, and other European countries.

Dr. D. E. H. Cleveland has been elected a member of the British Association of Dermatology and Syphilology (Canadian Branch).

Dr. W. W. Chipman has left Vancouver for the east, and will go on to Europe, where he intends doing post-graduate work in Vienna and other centres, returning to British Columbia in about three months.

Dr. C. W. Prowd, Radiologist of St. Paul's Hospital, and Dr. H. H. McIntosh, of the X-Ray Department of the Vancouver General Hospital, have left to attend the International Congress on Radiology at Stockholm.

UNITED STATES

The Inter-State Post-Graduate Assembly of North America will hold its convention this year at Atlanta, Georgia, from October 15th to 19th. A splendid program has been prepared. The morning of each day is devoted to diagnostic clinics, conducted by some of the most outstanding men in the profession in the United States.

Symposia will be held on malignant diseases, gynæcology, diseases of the genito-urinary, cardio-vascular, respiratory, gastro-intestinal and central nervous systems, and on diseases of the liver and gall bladder.

Among the visitors from outside the United States are a number of well-known medical men from Great Britain, Northern Ireland, and Canada. These are, G. E. Waugh, M.D., F.R.C.S., London; Charles Macauley, F.R.C.S., Dublin; Sir James Dundas-Grant, F.R.C.S., London; Hugh Thursfield, F.R.C.P., London; A. Ralph Thompson, F.R.C.P., London; William Ibbotson, F.R.C.S., London; J. E. R. McDonagh, F.R.C.S., London; T. P. Dunhill, F.R.C.S., London; L. S. T. Burrell, M.D., London; L. S. Dudgeon, F.R.C.P., Lindon; Farquhar Macrae, F.R.C.S., Glasgow; Otto F. Leyton, F.R.C.P., London; J. Howell Evans, F.R.C.S., London; Archibald Young, F.R.C.S., Glasgow; Donald Core, F.R.C.S., Manchester; L. L. Cassidy, F.R.C.S.I., Dublin; Sir Farquhar Buzzard, Oxford; F. W. Marlow, Toronto.

From other countries come, Drs. Edmund L. Gros, Paris, France; C. Beuttner, Geneva, Switzerland; D. J. Cranwell, Buenos Aires, Argentina; and Morris Roch, Geneva.

The program, as put forth, is of the highest interest and importance, and the convention will be well worth attending.

The 57th annual meeting of the American Public Health Association is to be held this year in Chicago, Illinois, from October 15th to 19th, with the Hotel Stevens as Association Headquarters. The American Child Health Association and the American Social Hygiene Association are to meet at the same time with this organization. The chairman of the local committee is Louis E. Schmidt, M.D., and the secretary is Arthur E. Gorman.

It should be noted that the annual meeting of the Canadian Public Health Association in Winnipeg will be held on October 12th, 13th and 14th, making it most convenient for those planning to attend the meetings of both associations.

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GENERAL

According to a report issued by the Health Organization of the League of Nations, there has been a great decrease in the incidence of small-pox in European countries during recent years. The only exception to this general rule is offered by Great Britain, where there has been a steady increase in the number of cases officially reported since 1920. In 1927 there were 14,931 cases in Great Britain, as compared with 6,841 in the rest of Europe. The disease is common only in a mild form, known as alastrim, but this mild form has been notably absent from Continental Europe, with the exception of Switzerland, where between 1921 and 1926 it persisted in epidemic form. In 1927, however, no cases were reported in that country. Despite the large number of cases in Great Britain, the mortality has been very low, no deaths having occurred in Scotland between 1922 and 1927, and only 49 deaths in 1927 in England and Wales. During the period under review the disease was limited largely to the north of England and the Midlands. Of 10,141 cases reported in 1926, 10,070 were reported from Durham (6,645), Yorkshire (1,270), Derbyshire (982), Northumberland (843), Nottinghamshire (191), and Lancashire (139). During the winter of 1927-28 a wider diffusion of infection occurred; 4,711 cases were reported from 38 counties in England and Wales in the first quarter of 1928, but the mortality has been almost negligible. The report states that vaccination within ten years appears to give complete immunity to the disease. Thus in 1926 there was not a single case among children below 12 years of age who had been vaccinated in infancy, whereas there were no fewer than 3,980 cases among children below 12 years of age who had never been vaccinated. That part of the report dealing with Russia shows a remarkable decrease in the number of cases since the war. In 1919 there were 186,755 cases, which gives a rate of 30 for every 10,000 inhabitants; in 1926 there were only 16,547 or 1.1 to every 10,000 inhabitants; in 1913 there were 4 cases to every 10,000 inhabitants. No case of small-pox was reported in Bulgaria, Czechoslovakia, Denmark, Gibraltar, Hungary, Lithuania, Luxembourg, Malta, or Rumania in January or February of this year.

The tenth international medical post-graduate course, with special reference to balneology and balneotherapy, will be held at Carlsbad from September 23 to 29, 1928. Clinicians and scientists from the medical faculties of Austria, Bulgaria, Czechoslovakia, Denmark, England, France, Germany, Italy, Norway, Poland, Sweden, Switzerland, and the United States of America will give addresses. England will be represented by Professor Hugh MacLean and Dr. George Graham. An invitation is extended to all medical practitioners. Those who accept will receive a passport visé without charge and a 33 per cent reduction on all state railways in Czechoslovakia. A program of entertainments has been arranged. Full information may be had from Dr. Edgar Ganz, secretary of the medical post-graduate course, Carlsbad, Czechoslovakia.

It is announced in the January issue of the *British Journal of Anæsthesia* that a prize of £50 is offered in commemoration of the late Dr. Sidney Rawson for the best research on inhalation anæsthesia between now and December 1st. In sending the essay a *nom de plume* is to be used; further information may be obtained from the editor of that journal "Ainsdale," Palatine Road, Withington, Manchester.

Ten lectures will be given at the Hôpital de la Charité, 47 rue Jacob, Paris, with roentgenologic projections and anatomical specimens, on the subject of diseases of the bronchi. Each lecture will be followed by practical demonstrations by MM. Bordet, Oury, Turpin, Kourilsky, and Benda.

The lectures will take place from October 29th to November 3rd, inclusive.

In the morning practical demonstrations will be made in the wards under the guidance of Professor Sergent.

The afternoon will be devoted to theoretical courses (from 2:30 p.m., to 3:30 p.m., and from 4 p.m., to 5 p.m.).

PROGRAM

Dr. F. Bordet, "Lipiodol in the diagnosis of the diseases of the respiratory tract," (two lectures).

Dr. Oury, "Bronchial forms of pulmonary tuberculosis."

Dr. Turpin, "Carcinoma of the bronchi," (two lectures).

Dr. Kourilsky, "Lung abscess," "Bronchiectasis," (two lectures).

Dr. Benda, "Bronchial forms of pulmonary syphilis," (two lectures).

Fees: 500 francs (about $20).

A certificate, signed by the Professor and the Dean of the Faculty of Medicine of Paris, will be given after the course to every doctor who has attended it regularly.

Dr. Julius Wagner-Jauregg of Vienna, who discovered the malarial treatment of patients with general paresis, has been awarded the Nobel Prize in Medicine for 1927.

Sleep Affected by Orientation (Points of the Compass)—Researches of Féré, Duchatel, Waucollier, and Reichenbach show that the position most favourable for regular and sound sleep is with head to the north, and the worst position is with head to the west. A series of carefully conducted tests of the variation of blood-pressure, of the different constituents of the blood, etc., prove that these are least when the person is lying with head to the north. This may explain the calm and restful sleep many persons enjoy when lying in this position.

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Book Reviews

Four Centuries of Medical History in Canada. John J. Heagerty, M.D., D.P.H., Department of Health, Ottawa. Two volumes. Vol. 1, xviii and 395 pp., 14 illustrations; vol. 2, vii and 374 pp., 24 illustrations. Price $12.00. The Macmillan Co. of Canada, Limited, Toronto, 1928.

The publication of these volumes is a distinct event in the history of the medical profession in Canada. As Dr. Heagerty well remarks in his preface, "In no country is the history of medicine so well-preserved as in Canada; in no country is the story so all-absorbing, so replete with striking incident." Hitherto, numerous, but disjointed, portions of this story have appeared in various magazines, in transactions, and formidable archives, and we indeed owe a debt of gratitude to those who have striven to give us some idea of the wealth and value of our historical heritage. Among these we may mention specially D. A. Campbell and W. H. Hattie, in Nova Scotia; MM. P. G. Roy, E. Z. Massicotte, P. L. N. Beaudry, the Abbé Casgrain, M. J. and Georges Ahern, A. H. David, Sir William Osler, W. H. Drummond, John McCrae, Maud Abbott, H. S. Birkett, M. Charlton, Sir Andrew MacPhail, in Quebec; and William Canniff, A. H. Wright, H. B. Anderson, and Thomas Gibson, in Ontario. Particularly noteworthy are The History of Medicine in Lower Canada, by Miss M. Charlton (*Annals of Medical History*, 1923, V., pp. 150 and 263; *ibid.*, 1924, VI. pp. 223 and 312), and The Medical Profession in Upper Canada, by Canniff (Briggs, Toronto, 1894). But, interesting and important as these are, they are but partial accounts. Dr. Heagerty's special merit lies in the fact that he has gathered together records, not easily accessible to the general reader, and has made them readily available to the student of medical history.

One has only to open the book to see where Dr. Heagerty's affections lie. With scarcely any preamble he plunges at once into the history of the great epidemics which have devastated Canada from the earliest times,—Mal de terre, small-pox; mal de Siam, plague, ship-fever; mal de la Baie St.-Paul, leprosy, cholera and influenza. This takes up 212 pages out of a total, in the first volume, of 393; the consideration of Public Health takes up 56, in addition to 50 more in the second volume. This ensures very thorough treatment. The balance of volume two deals with medical schools and hospitals, and there is an appendix on the medical history of Newfoundland.

This topical method of dealing with the subject is due to the desire of the author to create a work of reference for the student of Canadian medicine, rather than to write a story. In pursuance of this design the bibliography and the index are arranged topically also, which makes for ready reference. In consequence, much of the romance of the story is lost. Yet, so much is inherent in the subject that it inevitably crops out and does much to lighten the narrative.

As might be expected, the older settlements in the east receive the greater share of attention. Their recorded history goes back three hundred years and the record is remarkably complete; still the west is not forgotten.

The chapter on the pioneer physicians in the various provinces is good and of the highest interest, as are also the chapters dealing with medical societies and medical journals. The chapter on Medical and Surgical Progress is inadequate, considering the importance of the subject, occupying a scant seven pages. Medical legislation is dealt with in a helpful way. We note that the first medical society in Canada was the Quebec Medical Society, founded in 1826.

The illustrations are well selected but poorly executed. That of the Hôtel Dieu of Montreal is particularly bad. This is unfortunate, as this fault detracts from the appearance of an otherwise very pleasing bit of craftsmanship. A few typographical errors were noted in the first glance over the work, which will, doubtless, be corrected in another edition. In volume one, page 71, the word "hemorrhagic" is spelled "hemmorhagic" three times; on page 6, "Lorraine" should be "Louvaine;" on page 225, "St. Corne" should be "St. Côme."

It may truthfully be said that Dr. Heagerty has performed a signal service in bringing together so much interesting and valuable material in connection with the many and varied activities of our profession. Only those accustomed to literary work can appreciate the amount of time and industry required to consult the records as the author has done. A valuable feature, also, is that Dr. Heagerty has endeavoured to let the various authorities speak for themselves, and quotes many of the more important records verbatim, or translates them literally. The result is an authoritative work, which will be for long what the writer wishes it to be a reliable work of reference. It may well prove the inspiration for others to bring out works on certain aspects of Canadian medical history, perhaps along other lines, but which will add to our store of knowledge on the subject. Four Centuries of Medical History in Canada should be in the hands of every medical man in this country.

A. G. NICHOLLS.

Die Aeussere Sekretion der Verdauungsdrusen. B. P. Babkin, M.D., D.Sc. xiii and 886 pp., 145 illustrations. Second edition. Price (unbound) 68 reichsmarks. Julius Springer, Berlin, 1928.

This book on The External Secretion of the Digestive Glands forms volume XV. of a series of monographs dealing with the whole range of the physiology of plants and animals, edited by Drs. Gildemeister (Leipzig), Goldschmidt (Berlin), Neuberg (Berlin), Parnas (Lemberg), and Ruhland (Leipzig). The first edition appeared in 1914.

Professor Babkin was for ten years assistant to the renowned Pawlow in St. Petersburg, and himself assisted his teacher in the elucidation of many of the important problems connected with the function of digestion which the latter dealt with so helpfully in his epoch-making work of 1898. In this first edition all the work done on the subject in various countries was for the first time brought together.

In this, the second edition, the author has preserved the general plan of the first, giving, where possible, the original work and the particular methods of research on which his conclusions are based, but he has also collected and collated the vast literature on the subject that has accumulated between 1914 and 1927. He has more fully elaborated his text, and has added some new chapters, such as, The Continuous Secretion of the Gastric Juice, The Blood-supply of the Pancreas, The Secretion of Bile, The Function of the Gall-bladder, and Some Motor Phenomena of the Alimentary Canal. The second edition, then, is practically a new book, but yet preserves the spirit of the first.

Professor Babkin brings unusual qualifications to his task. Thoroughly grounded in his subject during his long association with the great Russian physiologist, he became professor in the University of Odessa; after the revolution he was enabled to make his escape to England, and worked in the Physiological Laboratories of University College, London, where he obtained his D.Sc. degree; he came to Canada in 1924 as Professor of Physiology in Dalhousie University, Halifax; and has quite recently been appointed a Research Professor in Physiology at McGill. Well acquainted with English, French, German, as well as his native Russian, he is particularly well fitted to cover the extensive literature of his subject. This he has done well, and, perhaps, for the first time in an important work published under German auspices has justice been done to the research workers in other countries. The scope of the research in this particular can be seen from the fact that out of about 2,600 references more than 900 are to British and American work. Among Canadians remembered are, Archibald, Collip, Dreyer, Meakins,

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The book is divided into seven sections, dealing respectively with the salivary glands; the gastric glands; the pyloric portion of the stomach and the Brunner's glands of the duodenum, the pancreas, the secretion of bile and its discharge into the duodenum, the glands of the small and large intestines, and the motor phenomena of the alimentary canal.

Each section is introduced by a brief account of the anatomy of the organs concerned. The operative technique in connection with the various experimental manipulations referred to is given in the necessary detail, with often, explanatory drawings. The various stimuli, the innervation, and the chemical constitution of the various excretions are fully given.

While to a large extent dealing with theory and the pure science of the subject, the book is intended at the some time to be practical and of value to the clinician Hence we find such subjects dealt with as the relationship of the saliva to dental caries, and the application of gastric physiology to the elucidation of surgical problems connected with the stomach.

The book has the usual appearance of the German scientific monograph, with clear text and convenient references. As might have been expected, it is well arranged, exhaustive, and simply written. No important detail is lacking. In the judgment of the reviewer, Professor Babkin's work is one of great value, the most complete, and the most authoritative on the subject that has yet appeared.

A. G. NICHOLLS

Atlas der Histotopographie gesunder und erkrankter Organe. von Dr. Erwin Christeller, Direktor der Pathologisch-Anatomischen Abteilung des Städtischen Rudolf Virchow-Krankenhauses in Berlin. With 182 directly reproduced coloured prints in 88 plates and 4 text figures. Published by George Thieme, Leipzig, 1927. Bound in linen with gold lettering.

In this handsome volume the results of the author's researches into the structural relations of the body-tissues in normal and diseased states by his own method of making frozen sections through entire organs for microscopic study and demonstration purposes, are set forth with much technical skill and in a highly instructive context. Its publication marks a new departure in the art of scientific reproduction, in that the negatives for the printers' use in the coloured plates are made directly from stained and mounted frozen sections, without the intervention of photographic prints; and it also represents a distinct advance in the field of tissue diagnosis and pathological research, in that the histological picture of the entire organ so obtained supplies a topographical survey of the inter-relations of the disease process along its zone of delimitation or advance that is of the greatest possible value. As the auth puts it in his Foreword, we have before us not merely a mass of authentic pathological data for the inspection and information of students, specialists, and research workers; rather it is his intention to show here that, from the employment and extension of technical methods in common use, a real step forward has been made both from the diagnostic and didactic standpoints, and new paths established for the successful investigation of the combined macro- and microscopic phenomena of disease. Up to this time this topographical method has been largely neglected. Small pieces of tissue are taken from suspected points and their relation to each other laboriously reconstructed with a necessary element of uncertainty that often leaves room for doubtful conclusions. Frozen sections through the entire organ, taken in such a way that its normal contour and relations are preserved, cut sufficiently thin for microscopic study and cleared, stained, and mounted under a coverglass, are substituted to great advantage. Neuropathology was the pioneer in this field and the central nervous system has long been studied with the help of serial sections through the entire brain differentiated by special stains and fixed in celloidin. Never before however have such large frozen sections been cut from other organs, and the results, as shown in this Atlas, are highly illuminating.

The volume contains some nineteen pages of Introduction, setting forth the advantages of this method, which is used as a routine process by Dr. Christeller and is found much cheaper and simpler, as well as yielding much positive histotopographical information that can be contained in no other way; and a minute description of the technique, both of preparing the *Gesamtgefrierschnitten* (total frozen sections), and of the reproduction by the printers from negatives, in three colours, prepared direct from the mounted section. This is followed by some 160 pages of the Atlas, in the plates of which the direct colour print of the section (enlarged one-half) is shown side by side with a three-colour reproduction of its microscopic appearances made under a low power magnification from the same section, and with a three colour print from another section through a normal organ of the same kind. On the page opposite to the plates full clinical data with descriptions and key to the lettering of the sections are given, so that each represents to the student a true clinico-pathological entity.

The advantages of this method are to the author a matter of daily experience. The proportion of correct tissue diagnoses achieved by him by means of these large frozen sections has been far above that obtained from smaller sections, and he insists that no one who has become accustomed to glance over the entire extent of an organ in this way for patchy areas of disease or a border of delimination would ever consent to relinquish it. Researches have been made in his laboratory with the assistance of these large frozen sections into the subject of hypertrophy of the prostate (200 cases), tumours of the urinary bladder, the histotopography of gonorrhœa, the distribution of neolymphoid tissue in the kidney and appendix, the study of cell-emboli and tumour metastases. For instruction and demonstration purposes to students these preparations have proved themselves invaluable, combining as they do the macroscopical impression of the complete organ and the pathological changes in it, with the differentiation of tissues by the various colours obtained by contrasting staining methods which are readily employed, the section being first mounted on its glass slide, and fixed in place with a thin coating of celloidin. Such stained sections are used for direct observation in the hand, or as transparencies by transmitted light, in which case they may be mounted on opaque glass enclosed in wooden frame and conveniently hung in a window. Or they may be shown to great advantage to large classes with the projecto-scope, by which their histological details are magnified as readily and as satisfactorily as is the case with an ordinary microscopic slide of small size.

It is also an extraordinary advantage that these large frozen sections lend themselves so readily to direct colour reproduction for publication without the intervention of a photographic print, and that enlargement in the process of printing secures more and more perfect detail, whereas, in printing from a photograph, enlargement merely brings the structure of the raw material of the paper itself into evidence, and must therefore be avoided.

The greatest value of all however lies in the working over of these large sections (which are usually 20 to 30 microns thick) by the microscope with increasing powers. The possibility of examining all parts of the organ by the magnification one chooses, makes the combination of macro- and microscopic relations conspicuously helpful and enables one to win in this way an entirely new oversight of the field of normal and pathological histology in an easily demonstrable form. The author warns however against any idea that through its portals a "new Atlantis" is to dawn for this subject, for the reason that the relatively low magnification

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that must be used for these sections of only a medium degree of thinness, leaves the problems of finer cell structure untouched.

In conclusion, it is to be stated with conviction that this book, with its clear exposition of the simple technique followed, its originality in the application of this in the new fields of histotopography and direct photography, its excellent illustrative material, and its fine colour reproduction, should be on the shelves of every medical library and in active use in all our pathological laboratories. It is to be hoped that an English translation may soon be available. MAUDE E. ABBOTT

The Heart in Modern Practice. Diagnosis and Treatment. William Duncan Reid, A.B., M.D., Professor of Cardiology, Boston University School of Medicine. Second edition. 466 pages, 81 illustrations. Price $6.50. J. B. Lippincott Co., Montreal, 1928.

Much has been revealed in the last few years in regard to our knowledge of heart disease, particularly through the use of instruments of precision such as the polygraph and the electro-cardiograph. Many minds have contributed their quota to this knowledge, and the author in this, his second edition, has incorporated all the recent advances in our knowledge of this subject.

The arrangement of the various divisions is excellent. The work is divided into five parts. The first gives us a clear conception of the normal heart; the methods of examination, including the graphic methods, are outlined; and a classification of heart disease given. In the second part is a description of the various types of heart disease. Myocarditis as a clinical entity is superseded to a large extent, and rightly so, by hypertensive heart disease, senescent heart disease, and cardio-vascular syphilis. Part three considers structural lesions. Part four takes up the arrhythmias at considerable length. Most works on the heart deal, in the reviewer's opinion, inadequately with this subject. The author has taken great pains to be clear and has succeeded remarkably well. In paroxysmal tachycardia vertigo is mentioned as one of the symptoms. Another symptom which might have been mentioned, is an apoplectiform attack of a transient nature.

The concluding section, part five, considers treatment. Two appendices follow, giving diets, occupations for heart cases, and reports illustrating the various clinical forms of heart disease.

The author of this work is a cardiologist of wide experience, and he seems to have realized the difficulties confronting the student and particularly the general practitioner in grasping the newer technical knowledge of heart disease. This volume of four hundred and sixty-six pages is well illustrated, and is printed in good sized type, with only an occasional typographical error. It can heartily be recommended to all students of heart disease. WILLIAM D. KEITH.

The Heart and its Diseases. Charles W. Chapman, M.D., M.R.C.P. 216 pages, illustrated. Price $2.50. E. & S. Livingstone, Edinburgh. The Macmillan Co. of Canada, Toronto, 1927.

A handbook on heart disease means a short, but instructive, assemblage of the present day knowledge of the disease of that organ. A writer of such a work must maintain a balance as regards the various divisions of his subject. The above volume under review fulfils these demands excellently. The whole field of cardiac disease is briefly covered and the new light that has been thrown on the subject by the study of the heart with the polygraph and electrocardiagraph is dealt with.

The writer draws our attention to the discoveries of the spirochæta pallida in the aortic wall and in the heart muscle. This, of course, leads to a much clearer conception of the problems of treating cardio-vascular syphilis.

Chapters are devoted to Anæsthetics in Heart Disease, and to Marriage and Maternity in Heart Disease, both subjects of very great practical importance. In the latter the author states the permissible and the non-permissible. Mitral stenosis with cyanosis he places in the non-permissible class.

The book is well printed and illustrated and will be found of very great practical usefulness by the busy practitioner and the student. WILLIAM D. KEITH.

Cardiac Arrhythmias. Clinical Features and Mechanism of the Irregular Heart. Irving H. Roth, M.D., Assistant in Medicine; Chief, Children's Cardiac Clinic, Mt. Sinai Hospital; Instructor in Post-Graduate Studies on Diseases of the Circulatory System conducted by Columbia University at Mt. Sinai Hospital, New York. Introduction by Dr. Emanuel Libman. xv and 210 pages, 80 illustrations, and 5 tables. Price $7.50. Paul B. Hoeber, Inc., New York, 1928.

In recent years a number of volumes dealing with disorders of the cardiac rhythm have been published. Some of them have been meagre in the information imparted, barely outlining the essential features of this phase of cardiac function. Others have been most exhaustive in dealing with the subject. The present volume strikes a happy medium and will be an excellent reference book for the student and practitioner. It is sufficiently comprehensive for all ordinary purposes. The first part, which deals with mechanical methods for the examination of the physiology and anatomy of the heart, forms an excellent introduction to the second part, which deals with the more usual forms of cardiac arrhythmia. The book is amply illustrated with diagrams and tracings, which go far to simplify the understanding of the different conditions considered. The text is concise and well arranged, all esential facts being dealt with. If any criticism could be offered it would be the impression that is conveyed that therapeusis is simple and direct, with results easily obtained. J. C. MEAKINS

Lobar Pneumonia. A Roentgenological Study. L. R. Sante, M.D., F.A.C.R., F.A.C.P. 137 pages, illustrated. Price $3.00. Paul B. Hoeber, Inc., New York, 1928.

This is an attempt to correlate the x-ray findings in the chest with the clinical and pathological manifestations of acute lobar pneumonia. The author in his preface states that "the influenza epidemics of 1918 and 1919 served to demonstrate beyond a doubt the great usefulness of roentgenographic examinations in diseases of the lungs, ... the other methods of examination in general use were of little value in forming an estimate of the character of the pathology present."

Most physicians will agree with the reviewer that there is possibly more than a grain of truth in the contention that roentgenographic examinations in diseases of the lungs are useful but that the latter part of the quotation is entirely untrue. Even were it possible in any general hospital to procure daily films during the course of the disease (influenza or pneumonia) the majority of us would still be loath to discard the clinical history, leucocyte count, sputum examination and the older methods of physical examination, of inspection, palpation, percussion and auscultation. Sante does not seem to realize that these older and tried methods for the study of variations in the sound-wave are at least as accurate as the study of the light-wave as recorded by the x-ray plate.

Be this as it may, the writer studied during a period of seven years 1188 cases of lobar pneumonia at the St. Louis City Hospital and at the St. Mary's Hospital group.

Because both in the experimental pneumonia of the laboratory animal and in the epidemic pneumonia of the adult human the consolidation begins in the hilum region and spreads rapidly towards the periphery, Sante believes that the x-rays will reveal the first diagnostic criterion! Further, "the advent of pneumococcus Type I Serum and the obvious necessity for early diagnosis to secure the full beneficial effect of the serum have rendered roentgen-ray examinations of even greater importance." Does the author wish to imply that we should use Type I serum in every case of consolidation of the lung as revealed by the x-ray? This is surely contrary to the practice of the wise physician. Lastly his claim that "with

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the information conveyed by serial film examination it was often found possible to detect beginning complications before they would be detected by other means" stamps the author as an enthusiast of the first water, and rather shakes one's confidence in the reliability of his other deductions. Nevertheless, the reader will find much of interest in the one hundred and twenty-six pages of this monograph and much to admire in the wonderful reproductions of the x-ray films. C. P. HOWARD.

Requisites and Methods in Surgery. Charles W. Cathcart, C.B.E., M.A., M.B., C.M., F.R.C.S., and J. N. Jackson Hartley, O.B.E., M.B., F.R.C.S. 476 pages, 246 illustrations. Price 12/6 net. Oliver & Boyd, Edinburgh, 1928.

This compact surgical handbook has been written as a guide for senior students and house surgeons, as well as for general practitioners. In many particulars this volume resembles the well-known work of Caird and Cathcart, for many years an indispensable manual of minor surgical handicraft. As the authors state in the preface they "realize the importance of general principles as a guide to the details of practice and have therefore tried to explain the connection between principles and practice as often as possible."

It embraces the modern knowledge of every day hospital practice, chiefly in regard to minor surgical technique, though certain parts of major surgical work are included. It abounds in a wealth of lucidly written details.

There are excellent chapters on case-taking, wound treatment, fractures and dislocations, emergencies, traumatic shock, as well as on pre- and post-operative treatment. More space might have been given to infiltration and conduction anæsthesia, if any criticism may be offered.

This work can be thoroughly recommended as a useful, sound, up-to-date manual of minor surgical methods of technique and treatment. G. E. LEARMONTH.

Primary Neoplasms of the Urinary Bladder. L. R. Fifield, F.R.C.S. 94 pages, illustrated. Price 7/6 net. H. K. Lewis & Co., London, 1928.

Probably the best recommendation that this little book could have is that if in some way every man in the medical profession could be induced to read it, there would be a very great diminution in the number of cases of hæmaturia that are treated for months and years without thorough investigation, and a consequent reduction in the number of inoperable tumours of the urinary bladder that present themselves to the urologist for treatment.

There is no padding between its covers and while it might be justly accused of skimping detail, it gives a general survey of the subject in a concise and readable way which makes its perusal a pleasure and well worth while.

E. J. BOARDMAN.

Physiology and Biochemistry of Bacteria. R. E. Buchanan, Ph.D., and E. I. Fulmer, Ph.D. 516 pages and 78 illustrations. Price $7.50. Williams & Wilkins, Baltimore, 1928.

A justification for printing a book of this type is implied in the statement by the authors that "The literature bearing on the subject of the relationship existing between microörganisms and their environment, chemical and physical (i.e. physiological bacteriology) is widely scattered."

The subject matter is treated under the following headings:—growth phases and growth rates in cultures of microörganisms; chemical composition of the cells; physico-chemical and physical characteristics of microörganisms and their environment; energy relationships; growth and movement of microörganisms.

An extremely useful compilation of data is presented under the heading "Chemical composition of cells." These data refer not only to the cells of microörganisms, but also to certain extracellular products, in particular to pigments. There is no discussion of the chemistry of extracellular antigenic substances.

At least 200 pages of the book are devoted to a review of certain aspects of physical chemistry. While this exposition is quite excellent, it appears at first to be somewhat superfluous. However, the inclusion of this section is probably justified in view of the fact that the book was designed, in part at least, as a class text. The authors state that it is "essentially a combination and revision of lectures on the physiology of bacteria and on biophysical chemistry given at the Iowa State College to students of bacteriology."

This book is numbered volume I. The authors do not indicate the content of volumes which may follow. To anyone interested in the fundamental problems of the various phenomena exhibited by microörganisms the book should be of value.

J. G. FITZGERALD.

Filterable Viruses. Edited by Thomas M. Rivers, M.D. 414 pages. Price $7.50. Williams & Wilkins, Baltimore, 1928.

Most of the writing on this subject has been in the form of papers in scientific journals, and a review and summary of them, such as is here given by a group of ten writers, is of timely interest. The term "filterable viruses" is used to include all the ultramicroscopic filter-passing agents of disease both in the animal and vegetable world, and it is only to be expected that their study must be confined to specially trained workers, but the outcome of their work cannot fail to be interesting to medical men generally.

Filterable viruses were first recognized in 1872, and since then it has been shown that many diseases both in the vegetable and animal world are caused by agents smaller than ordinary bacteria. But Dr. Rivers points out how complex are the factors which affect the passage of viruses through filters. The size of the virus, its electrical charge, and the electrical charge of the filter itself, the amount of protein or other substances in the virus emulsion, the temperature and pressure employed, as well as other unknown circumstances, all serve to influence filtration experiments, to which must be added the fact that a virus may be inactivated by the filtration. These considerations alone call for the greatest care in interpreting results.

Another difficulty arises in the cultivation of these viruses. All indications at present are that they will grow only in the presence of living cells, and progress in understanding their natural history can only come by studying them in the host, or in emulsions and filtrates of tissues. This point is elaborated in a chapter on Tissue Cultures by Dr. Alexis Carrel, who describes the technique with which his name is so closely associated.

Another chapter is devoted to the study of intracellular bodies, with a full discussion of the inclusion bodies which are so definitely associated with many diseases of unknown etiology, *e.g.*, rabies. What these inclusion bodies are, however, is still a matter of dispute. Are they true microörganisms, or are they produced in the cell as a reaction to the virus? The view advanced by Dr. Cowdry in this chapter is that they are outward and visible signs (within the cell) of the action of the virus on the life of the cell. The primary changes brought about in the activities of the cell do not show themselves by any visible structural alterations (as far as can be seen at present); the inclusion body is a later stage in the course of events. It is suggested that when we know more about the first influences of the virus on cell life, such changes as those occurring in the respiration of the cell, its permeability, its powers of assimilation and excretion, its viscosity, its irritability, etc., then we may get clues as to the nature of the viruses themselves. How does the virus even enter the cell, if indeed it does enter at all?

Chapter V. is devoted to poliomyelitis, as an example of a virus disease in man. It is concluded that the globoid bodies isolated by Flexner and Noguchi from poliomyelitic tissue, whilst being distinctly organisms, are not yet clearly understood in their relationship to the disease; "they may be unusual forms of the true virus, which is unlikely, or they may adsorb and keep viable the true virus." Any streptococcal forms which have been described in connection with these diseases are to be regarded as agonal invaders. This accounts for the failure of the

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sera which have been employed in treatment, since they are really antistreptococcic sera.

There is a concluding chapter on the virus disease of bacteria themselves, that is the bacteriophage. It is admitted, however, that this view of bacteriophagy is in dispute.

This book is well worth reading. It is evident throughout that most of the views advanced are subject to criticism, but the whole subject is brought into focus, and very full and well arranged bibliographies are provided with each chapter for those who wish to follow it further.

H. E. MACDERMOT.

Text-Book of General Bacteriology. Edwin O. Jordan, Ph.D. 9th edition, revised. 777 pages, illustrated. Price $6.00. London and Philadelphia, W. B. Saunders Co.; McAinsh & Co., Toronto, 1928.

The ninth edition of the well-known text-book on general bacteriology, by Professor Edwin O. Jordan, Ph.D., Chicago, Ill., has been brought up to date by the inclusion so far as possible of the latest literature. Many important sections have been revised and amplified, and a number of new text figures have also been added.

New material has been added on the rôle of streptococci in the bacteriology of scarlet fever, erysipelas and rheumatic fever. The Dicks' test and prophylactic innoculation against scarlet fever and its close analogy to the longer known Schick test in diphtheria is given due prominence. The section on the bacteriology of water now includes the recent findings and methods embodied in the Sixth Report of the American Committee on Standard Methods. The chapter on Parasitic Protozoa has been entirely re-written but it is regretted that it has not been still further extended to include the parasitic flat and round worms (Phyla; Platythelminthes and Nemathelminthes), as this would obviate the necessity of the student in elementary parasitology (this course often being included with bacteriology), purchasing a separate book on that subject. In addition to the chapters devoted to the individual groups of pathogenic microorganisms are interesting sections on the common bacterial diseases of plants, bacteria in the Arts and Industries, and on bacteria and the nitrogen cycle.

The description of the various microörganisms is extremely lucid, and includes *Brucella abortus* and *Bacterium tularense*. A small section of the common bacteria found in the mouth and their significance could, with advantage, be added for the benefit of the dental student and practitioner. The rôle of carriers in disease, while dealt with fairly extensively along with the individual organisms, merits, too, a separate chapter. The chapter on immunity is concise but somewhat brief. In dealing with the differential media employed in the isolation of B.typosus from the fæces, etc., no mention is made of MacConkey's bile-salt-neutral red-lactose agar, a medium which is still used in routine work in Great Britain.

The fact that the text-book has reached its ninth edition since 1908 speaks for its popularity and usefulness. It is eminently readable, accurate, sound and generally comprehensive and thoroughly deserves its continued popularity. Suitable for students and practitioners alike and also for reference by the more advanced investigator, it deals with the fundamental principles and methods of laboratory work, and includes bibliographical references to articles of classical and historical interest. The author has, so far as possible, simplified conflicting views so as to give a readable account of the subject in question, and has included references to the fields where investigation is still active or opinions are at variance, and also some giving valuable summaries of important subjects.

RALPH P. SMITH.

Nutrition. Walter H. Eddy, Ph.D., Professor of Physiological Chemistry, Teachers' College, Columbia University. 236 pages. Price $2.50. The Williams & Wilkins Company, Baltimore, 1928.

There is great need for a book on nutrition written for the general public in simple language. Such a need is met reasonably well by Dr. Eddy's small volume. The quantitative and qualitative food values of the different constituents of a diet are dealt with, the optimum requirements of proteins, fats, and carbohydrates are stated, and the causes of variations in food value of proteins from animal and plant sources are explained. Reasons are given for our dietary requirements of different mineral elements, and there is a good account of acid-base equilibrium and its dependence on diet. The necessity for roughage in a diet is emphasized, and the vitamins are dealt with very fully. Alcohol, as a nutrient, is carefully avoided.

The last one hundred pages of the text are devoted to vitamins. Although the author himself states "it is true that the presence of vitamins in the diet is essential to health, but this presence is no more imperative than calories, nutrient quality, digestibility, etc.," and although, since he himself has done much valuable vitamin research, he is naturally led to emphasize this phase of his subject, yet it seems regrettable that inevitably such a preponderance of page material on this one phase of nutrition must unduly stress it for the lay reader, so that thereby the treatment of the whole subject is unbalanced. Much of the experimental vitamin procedure that he has detailed could well have been omitted. In its place a section dealing with the effect of food-preparation on food value is badly required. The very few formulae and equations could well have been eliminated.

In spite of such imperfections, the book will have a real use in conveying to the man in the street and his wife many of the facts regarding the universal occupation of eating that we all should know, especially in these days of "purified" foods. The author's attitude with regard to food advertisements and vitamin advertisements is sound. He endorses McCollum's advice: "The place to get vitamins is in the market, in the grocery store, from the milk man, and from the garden, and not from the drug store." The physician will probably find the book of service in introducing it to patients whose co-operation in dietary measures he wishes to secure.

A. T. CAMERON.

Mongolism. Kate Brousseau. Revised by H. G. Brainerd, M.D. 302 pages, 47 illustrations. Price $4.50. Williams & Wilkins Co., Baltimore, 1928.

The material presented in this work is based upon personal experience with Mongolian imbeciles and other types of defectives, during a period of ten years. The tabulated statistics and the charts were compiled from personal observations as well as from case reports published in medical literature. More than one thousand of these were studied. From this wealth of material the authors have presented, in most excellent form and order, the best single study of this condition.

Following a brief historical review the various theories regarding etiology are thoroughly reviewed. The authors then proceed in order to discuss pathology, diagnosis, prognosis and finally the education and training of these defects. Many excellent photographs illustrating the various physical defects are interspersed throughout the text which lend materially to its value.

This monograph may well be recommended to the research worker, the psychologist and the teacher.

ALAN BROWN.

The Ultra-violet Rays. Their Action on Internal and Nervous Diseases and Use in Preventing Loss of Colour and Falling of the Hair. Arnold Lorand, M.D. 258 pages. Price $2.75. F. A. Davis Co., Philadelphia, 1928.

This volume describes the experience of the author in the use of actino-therapy in the treatment of a large number of internal diseases of obscure origin and doubtful etiology, ranging from hyperpiesis to canities and alopecia. Rather more than half the book is devoted to the causation and treatment of the latter conditions. In the early chapters Dr. Lorand gives an interesting résumé of heliotherapy, ancient and modern; the character of sunlight under differing geographical and climatic conditions; and the varying effects of the elements of the solar spectrum.

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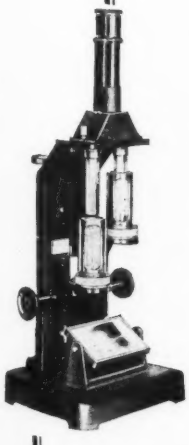

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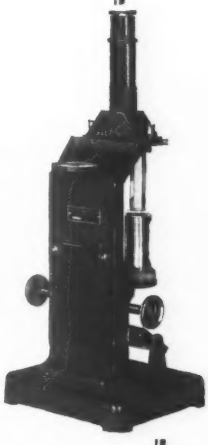

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tion are ascribed by the author to its action upon the endocrine glands and the sympathetic nervous system. In estimating the effect of treatment, Dr. Lorand has made no effort to narrow the active agent down to the ultra-violet ray, but has utilized at the same time any other method of treatment which has been thought to be of value, *e.g.*, (p. 87), "I have obtained the most striking results in ageing women by the administration of thyroid, ovarial and occasionally pancreatic extracts, in combination with the quartz-light, radio-active mud baths and certain amounts of iodine and arsenic."

As a spa physician Dr. Lorand's patients are no doubt chiefly drawn from the well-to-do class of bored neurotics, in whom the psychical value of a new form of treatment will count for much. In the comparatively few cases of definite organic disease which he refers to (*e.g.*, gall-stones) that portion of benefit attributable to the ultra-violet ray is very indefinite indeed.

In his technique Dr. Lorand is a trifle vague. "Of course the treatment should not be overdone, the sitting should not last too long, and the source of light should be neither too far or too near," (p. 85).

The book will probably achieve greater popularity with the general public than with the medical profession. The language is simple, technical expressions are avoided; even the term alopecia areata is carefully defined and the statements are so general as to leave much to faith.

The publishers have done well. The book is of a convenient size, well printed in large type on good paper, and strongly bound. W. T. LOCKHART.

International Clinics. Edited by Henry W. Cattell, A.M., M.D., and others. Vol. ii, 38th series. Price 3.00 each volume, $12.00 for set of four. J. B. Lippincott Co., Montreal, 1928.

This volume marks another semi-centennial stage in the "International Clinics." It is the 150th volume issued since the foundation of the undertaking in 1891. There is an introductory note by Sir Humphry Rolleston recalling the fact that the 100th volume was the occasion of an article by Sir William Osler, in which he spke of the coming of age of international medicine in America. The present editor, Dr. H. W. Cattell, has been in charge of the "Clinics" for the greater part of the time since 1900, and has been one of the guiding influences of the publication. Dr. A. McPhedran in a note on Canadian contributions mentions their steady increase since the first article on insulin by Banting in 1923, although there had been a few articles from Canadian authors before that.

Taken all round, this volume is thoroughly well edited and arranged, covering a wide variety of subjects in medicine. H. E. MACDERMOT.

An Introduction to the Technique of Section-Cutting. Edited by Frances M. Ballantyne, M.A., Assistant in the Zoology Department, the University of Glasgow. xii and 61 pp., 2 figures. Price three shillings net. E. & S. Livingstone, Edinburgh, 1928.

In the introduction to this little work Professor J. Graham Kerr points out the need for a satisfactory small, elementary book which can be recommended to junior students as providing reliable instruction in the ordinary stock methods of cutting microscopical sections in paraffin and celloidin. The methods described are arranged and elaborated from the notes of the late Mr. Peter Jamieson, expert technician in the Department of Zoology of Glasgow, and from those of Professor Kerr.

Care is taken to put forward only the simplest and most essential elements in the technique, but the many small things that make for success are by no means overlooked. Scrupulous attention to the necessary detail is inculcated. The fixative recommended for the beginner is a saturated watery solution of corrosive sublimate containing five per cent of glacial acetic acid. Dehydration is to be brought about by successive baths of 30, 50, 70, 90,, and 100 per cent alcohol. The paraffin recommended is that of the best quality, translucent, and bluish in colour, with a melting point of 52 degrees C. It should give a metallic ring when struck on a wooden table. Simple staining, in bulk and on the slide, is described. After the bare outlines of the paraffin method have been set forth, a complementary chapter is given which contains many additional hints of value, together with certain modifications that may be required for special purposes.

The celloidin method, both for serial and single sections, is described fully, and useful hints in regard to the use of section knives are given.

The book well fulfils its purpose and can thoroughly be recommended for laboratory use to the beginner.

A. G. NICHOLLS.

Local Anæsthesia. Geza de Takats, M.D., M.S. 221 pages, illustrated. Price $4.50. London and Philadelphia, W. B. Saunders Co.; Canada, McAinsh & Co., Toronto, 1928.

This book clearly and concisely covers the whole field of local anæsthesia as we know it to-day, and as such deserves a place in the library as a text for the beginner and a reference for the initiated. Its sequence is good. It is brief and to the point and free from the monotonous preamble so frequently found at the beginning of medical books. The print is clear and easily read, and the illustrations are excellent.

The only criticism, if such it be, seems the too free use of adrenalin as a binder for the novocaine in subcutaneous and deep injections. Many of us feel that the untoward reactions, which some times occur in the use of local anæsthesia, are often, if not always, due to the patient's idiosyncrasy to adrenalin rather than the toxicity of the novocaine. A. J. STEWART.

A Treatise on Diseases of the Hair and Scalp. S. Dana Hubbard, M.D. 500 pages. Illustrated with 77 engravings and 4 coloured plates. Price $5.50. Lea & Febiger, Philadelphia, 1928.

This treatise is a resumé of the known facts with regard to physiological and pathological conditions of the human scalp, and, as the author says, it has been compiled so as to give a practical digest of the subject.

In addition to chapters on anatomy, physiology, and clinical conditions that may be encountered in the hair and scalp, there are special chapters dealing with cosmetics, dressing and curling the hair and public regulations of beauty culture, matters that concern the barber shop or beauty shop and are not of direct medical or dermatological interest. The subject matter is essentially practical and special attention is directed to treatment.

J. F. BURGESS

BOOKS RECEIVED

Acute Aplastic Anæmia. Its Relation to a Liver Hormone. A Hayes Smith. 80 pages, price 6/- net. H. K. Lewis & Co., London, 1928.

A very fully recorded and worked out case report, and comparisons with other similar cases.

Surgical Clinics of North America. Vol. viii, No. 2. New York Number. W. B. Saunders Co., Philadelphia, 1928.

This is the New York number with an interesting series of well illustrated cases.